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MODERATORS OF THE ASSOCIATION BETWEEN MARIJUANA AND OTHER DRUGS

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MODERATORS OF THE ASSOCIATION BETWEEN MARIJUANA AND OTHER DRUGS

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Moderators of the Association
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This study examined selected potential moderators and mediators of the association between marijuana and other drugs. A sample of University of Texas at Austin students, 219 of whom were marijuana users and 47 of whom were non-marijuana users, filled out questionnaires that examined their use of various drugs, as well as their family backgrounds, levels of depression and anxiety, personalities, and peer relationships. Results indicated that peer influence and personalities related to behavioral disinhibition did not moderate or mediate the association between marijuana and other drugs. Peer influence was the strongest predictor of both marijuana and other drug use, and parenting styles, discipline, depression, and anxiety were not significantly associated with marijuana and drug use. Personality related to behavioral disinhibition was

associated with drugs when singularly regressed onto measures of drug use, but not when simultaneously regressed onto drug use with marijuana use. Furthermore, participants in the current study used marijuana before they used other illicit drugs. The implications of these findings for substance abuse prevention and treatment are discussed and suggestions for teachers, psychologists and other mental health professionals working in these environments are offered.

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Chapter 1: *The Problem in Perspective*

The negative consequences of alcohol and drug use are a major health-related issue in the United States. The costs of alcohol and drug use are estimated to be over 100 billion dollars per year in the United States, including the costs to the health care system, the costs of criminal behavior related to substance use, and the costs related to job loss and family impoverishment (Harwood, Fountain & Livermore, 1998). Despite myriad negative social and health consequences associated with alcohol, tobacco, and illicit drugs, the recreational use of such drugs has become widespread among adolescents and young adults (Hall, Johnston & Donnelly, 1998). Numerous studies attempting to explain the etiology of alcohol and drug use have yet to yield a definitive understanding of why certain adolescents have problems with alcohol and illicit drugs, and others do not. It is clear that drug use contributes to social, educational and health problems, yet it remains unclear exactly how these problems evolve and how they can be prevented.

Several theories have been purported to explain the etiology of alcohol and drug use disorders. Most of these theories have attempted to distinguish between the initiation of drug use and higher levels of drug abuse (Glantz & Pickens, 1992; Glantz, Weinberg, Miner & Colliver, 1999), and there exist both biological and social-environmental theories of substance abuse. There is, however, almost certainly more than one path that leads to drug use and drug use disorders, and despite many similarities common to different adolescents' drug use patterns, there are also important dimensions in which they vary (Cadoret, Yates, Troughton, Woodworth & Stewart, 1995). Using the stage theory of substance abuse, the current study will examine the progression of drug use in

adolescents and attempt to learn more about what factors lead some adolescents progress from drug experimentation to more serious drug abuse, while others do not abuse drugs after early experimentation.

THE STAGE THEORY OF SUBSTANCE ABUSE

One theory that has attempted to explain the etiology of illicit drug use by adolescents is the stage theory of substance abuse (Kandel & Faust, 1975; Kandel, Yamaguchi & Chen, 1992). This theory posits that adolescents tend to follow a sequential pattern of involvement in legal and illegal drugs; substance use and abuse in young people follows a generally predictable progression in which the use of drugs that are legal for adults, such as alcohol and tobacco, precede the use of marijuana, which precedes the use of other illegal drugs. In this sequence, it has been suggested that marijuana is a "gateway drug", where the use of this drug increases the likelihood that the users will progress to taking other illicit, and potentially more harmful, drugs.

The assumptions of stage theory have been controversial, and it has been argued that the associations between marijuana use and other illicit drug use reflect a common underlying predisposition to substance use or sensation-seeking behavior (Hays, Widaman, Dimatteo & Stacy, 1987; Huba, Wingard & Bentler, 1981). Under this model, the relation between marijuana and other drugs is completely non-causal and arises because the risk factors that predispose adolescents to use marijuana also predispose them to use cocaine or heroin (Hays et al., 1987; MacCoun, 1998). In other words, some underlying factor increases the likelihood that adolescents will use drugs, and they tend to use marijuana before the other drugs because it is the most readily available illicit

substance. Golub and Johnson (1998) make a compelling argument that alcohol is not a gateway drug, despite almost always being used before other substances, because other underlying factors are responsible for the association between alcohol use and subsequent drug use.

Despite potential alternative explanations, such as those mentioned above, there remains strong evidence in support of the stage theory for marijuana use causing further illicit drug use. Kandel et al. (1992) conducted a longitudinal study following a cohort from ages 15 to 35 and attempted to statistically control for potential underlying risk factors towards substance abuse. They tested alternative models of the stages of progression in drug involvement from adolescence to adulthood for goodness of fit, and found that even after controlling for other potential risk factors, 95.7 % of men and 95.1% of women used marijuana prior to other illicit drugs.

Similarly, Fergusson and Horwood (2000) conducted a 21-year longitudinal study of 1265 children and, after controlling for myriad variables including socio-economic factors, family environment, parental adjustment (parental alcoholism, drug use and criminality), and individual characteristics (gender, novelty seeking, juvenile offending, peer affiliations, stressful life events, and childhood sexual abuse), they found that marijuana use remained strongly associated to the onset of other forms of illicit drug use. Furthermore, O'Donnell and Clayton (1982) argued that marijuana use is a cause of heroin use because the two drugs are statistically related, marijuana precedes heroin use in almost every case, and the association between the drugs has not been shown to be spurious. These authors also examined reasons for rejecting the causal connection and argued that reasons for rejection are often erroneous.

The findings by Kandel et al., Fergusson and Horwood, and O'Donnell and Clayton support the possibility that marijuana may act as a gateway drug that encourages other illicit drug use. Despite these studies, however, the fact still remains that while some adolescent marijuana users go on to use and abuse stimulants and opiates, others do not (U.S. Department of Health and Human Services, 2000). It is still unclear as to what factors lead those who do use other illicit drugs after marijuana to do so. Further examination of variables associated with substance use may help to provide part of the answer.

DEMOGRAPHIC VARIABLES ASSOCIATED WITH SUBSTANCE USE

Gender

Several variables, including gender, have been examined as potential risk factors for substance use problems. In general, males begin using substances at an earlier age than females, and tend to be more likely to drink, drink heavily, and experience alcohol-related problems than females (Fergusson, Horwood & Lynskey, 1995; Johnstone, 1994; U.S. Department of Health and Human Services, 1997). For example, a study in Sydney, Australia found that males were twice as likely as females to be heavy drinkers and more than four times as likely to use marijuana (Oldenburg & Lemon, 1992). Furthermore, males are more likely than females to use illicit drugs, to use drugs to cope with problems, and to engage in poly-drug use (Health Education Unit, Sydney, Australia, 1998).

Studies in the United States have found similar results. The Texas Commission on Alcohol and Drug Abuse found men to be as much as three times more likely to obtain substance abuse treatment than women (Texas Commission on Alcohol and Drug Abuse, 2001). The National Longitudinal Alcohol Epidemiological Survey (NLAES) found, via face-to-face interviews of 42,862 respondents, that lifetime rates of alcohol abuse were higher for males than for females (7.0% for men to 2.9% for women), as well as that lifetime rates of alcohol dependence were higher for males than for females (18.6% to 8.4%; Grant, Peterson, Dawson & Chou, 1994). This same survey found that lifetime rates of drug abuse were also higher for males than females (4.4% to 2.0%), and that a similar pattern was found for drug dependence (3.7% for men to 2.2% for women; Grant, et al., 1994).

Ethnicity

Studies examining the role of ethnicity in drug use and abuse can be difficult to interpret due to various methodological problems (Spooner, 1999). For example, studies often differ on how ethnicity is defined. Ethnicity can be defined in numerous ways, such as language spoken at home, religion, country of birth, country of parents' birth, and national heritage. Furthermore, national borders change with time and nations tend to include a variety of cultures. With a large number of ethnic groups in multi-cultural countries, it is often difficult to obtain reliable data for each group. Additionally, the influence of a local culture on any particular individual from any ethnic group can vary, depending on factors such as length of residence in a country and commitment of the individual and his or her family to adopting the culture of said country. Taking many of

these factors into account, research conducted with adolescents in Australia has found that ethnicity does not tend to be a useful indicator of problematic drug use (Fleming, Watson, McDonald & Alexander, 1991; Kahn, Hunter, Heather & Tebbutt, 1990).

In the United States, the findings regarding ethnicity and drug use are still unclear. Most surveys of drug and alcohol use among adolescents are based on school populations, and thus do not take into account teenagers who have dropped out of school or who were absent the day of data collection (Sanjuan & Lagenbucher, 1999). Still, the literature supports the possibility that there are ethnic differences in drug abuse rates. Johnston, O'Malley and Bachman (1995) found that African-American youths tend to have lower rates of substance use than Caucasians or Latinos. This finding is supported by the NLAES, which found that a lifetime diagnosis of alcohol abuse or dependence was more likely for Caucasians and Latinos (approximately 19.1% received such a diagnosis) than for African-Americans (10.8%; Grant, et al., 1994). Similarly, a lifetime diagnosis of drug abuse or dependence was found to be more likely in Caucasians and Latinos (6.3%) than for African-Americans (4.0%). So although these findings do need to be interpreted with caution, the literature supports the possibility that there is a connection between ethnicity and drug use and abuse.

Socio-economic Status

There is also some discrepancy in the literature regarding the association between socio-economic status (SES) and drug use (Johnstone, 1994). Hawkins and colleagues concluded on the basis of their review of the etiology of drug abuse that there is no significant association between these variables (Hawkins, Catalano & Miller, 1992),

whereas Dryfoo's (1990) review suggested that SES is an important risk factor for problem behaviors, including drug abuse. Smart, Adlaf, and Walsh (1994) hypothesized that previous failures to find a link between SES and drug use in studies of adolescents may be due to the adolescents being studied not knowing the SES characteristics of their families. These researchers conducted a study where they used the adolescents' postal codes as an indicator of SES, as they reasoned that adolescents do know their postal routes and zip codes, and that the SES characteristics of each postal code area could be ascertained. Specific identifiers of low SES areas were low-cost and/or sub-standard housing, social problems, and delinquency. The authors found that the highest drug use and problems existed in the areas with the lowest SES characteristics and concluded that SES is associated with drug use and abuse.

FAMILY FACTORS IN THE ETIOLOGY OF SUBSTANCE ABUSE

The influences of family on adolescent drug use are important, but very complex (Jacob & Leonard, 1994; Newcomb, 1994). Alcohol and drug use disorders are determined by an association of genetic, environmental, and other variables. Many physical and psychiatric disorders are familial in nature, but teasing apart the variance due to genetic, non-genetic biological, and environmental factors in the development of substance use problems can be a difficult venture. There is, however, a substantial literature that has attempted to tease apart the genetic contribution to substance use problems from other sources of variance, based on studies of family prevalence, monozygotic and dizygotic twins, and adoptees.

Genetics in Alcoholism

An estimated 20% to 25% of sons and approximately 5% of daughters of alcoholics become alcoholics themselves (Cotton, 1979; Goodwin, 1979). Similarly, approximately 20% to 25% of male siblings and 5% of female siblings of alcoholics meet the Diagnostic and Statistical Manual (DSM) criteria for alcohol dependence at some point in their lives. In addition, a study of hospitalized alcoholics found that as many as 80% may have a close biological relative with alcohol-related problems (Hesselbrock & Hesselbrock, 1992). Although these results suggest a possible genetic component to alcoholism, further evidence from twin and adoption studies help strengthen this assertion.

If there is a biological basis to alcoholism, one would predict that children of alcoholics adopted at birth and raised by non-alcoholics would have a higher rate of alcoholism than the general population. Adoption studies conducted in Demark, Sweden and the United States revealed that adult children of alcoholics raised by non-alcoholic adoptive parents had a relatively high rate of alcoholism; their rate was about as high as that found in children of alcoholics raised by their natural parents (Bohman, 1978; Cadoret, Cain & Grove, 1979; Goodwin, Schulsinger, Hermansen, Guze & Winokur, 1973).

In addition, a biological basis to alcoholism would also be associated with a higher concordance rate among monozygotic twins than dizygotic twins. The majority of twin studies have reported that outcome (Kendler, Heath, Neale, Kessler & Eaves, 1992; McGue, Pickens & Svikis, 1992; Pickens, Svikis, McGue, Lykken, Heston & Clayton, 1991). Furthermore, monozygotic twins raised by different sets of adoptive parents have

also been found to have higher concordance rates of alcoholism than dizygotic twins raised apart (Hayakawa, 1987; Kaprio, Koskenvuo, Langinvainio, Romanov, Sarna & Rose, 1987; Pedersen, Friberg, Floderus-Myrhed, McClearn & Plomin, 1984). These studies provide additional support for the role of genetic factors in the vulnerability to alcoholism.

Genetics in Drug Abuse and Dependence

Family studies with drug abusers also suggest a possible genetic etiology for substance dependences other than alcoholism. For example, Merikangas, Stolar, Stevens, Goulet, Preisig, Fenton, Zhang, O'Malley and Rounsaville (1998) found an eightfold increased risk of drug use disorders for first-degree relatives of probands with drug dependence compared to control probands. Rounsaville and colleagues found higher rates of opiate dependence among the relatives of opiate-dependent individuals than in the relatives of non-dependent individuals (Rounsaville, Kosten, Weissman, Prusoff, Pauls, Anton & Merikangas, 1991). Parents and siblings of cocaine abusers also tend to show high rates of drug abuse and alcoholism, suggesting not only a genetic link for drug dependence, but also a possible genetic link between drug abuse and alcoholism (Kosten, Anton & Rounsaville, 1992). Additionally, there is a significantly higher prevalence of drug dependence among the biological relatives of inpatients with non-alcohol chemical dependency than in the general population (Meuller, Rinehart, Cadoret & Troughton, 1988).

Although family studies can show that genes might be involved in the development of drug use disorders, twin and adoption studies are again needed to provide

estimates of extent of those genetic effects. Tsuang and colleagues' review of twin and adoption studies determined that the heritability for men with cocaine dependence was approximately 44% and the heritability of men with opiate dependence was approximately 54% (Tsuang, Lyons, Eisen, Goldberg, True, Lin, Meyer, Toomey, Faraone & Eaves, 1996). Similarly, heritability estimates for females with cocaine dependence have been found to be even higher at 79% (Kendler & Prescott, 1998). Thus, the tendency to become dependent on alcohol and drugs is highly influenced by genetic factors. Nevertheless, in no case has heritability been found to be 100%, indicating there are always environmental factors involved in the etiology of drug use disorders.

Non-genetic Family Factors

Factors regarding the quality and consistency of family management, family communication, family relationships, and parental role-modeling have been consistently identified as predictive of drug abuse (Hawkins, Lishner & Catalano, 1985; Merikangas, Dierker & Fenton, 1998). Specific family factors include (a) ineffective parental family management techniques (e.g. lack of or inconsistent discipline; Patterson, Reid & Dishion, 1992); (b) negative communication patterns (e.g. blaming, criticism; Hawkins et al., 1985); (c) poor family relationships, as indicated by negative family relationships (Crundall, 1993; Pandina & Schuele, 1983), low level of family bonding (Brook, Brook, Gordon, Whiteman & Cohen, 1990), lack of sharing of affection and communication with children or parental interest in the children's activities (Climent, de Aragon & Plutchik, 1989), and child abuse (Dembo, 1987); and (d) poor parental role modeling, as evidenced by parental criminality or anti-social behavior (Hawkins et al., 1985), parental drug abuse

(Duncan, Duncan, Hops & Stoolmiller, 1995; Gfroerer, 1987), positive attitudes towards drugs by parents (Climent, 1989; Kandel, 1982), and parental modeling of drug use as a coping strategy (Patterson, 1986).

Being in a single-parent household has also been purported as a significant risk factor for drug use (Lecca & Watts, 1993). When statistical adjustments are made for social and contextual factors (such as family relations and socioeconomic status), however, this family structure has been found to have little or no impact on drug using behavior (Dryfoos, 1990; Fergusson, Horwood & Lynskey, 1994; Resnik, Harris & Blum, 1993). So although being in a single-parent household may not increase the risk of substance use, it appears that various aspects of the family experience exert at least some effect on the etiology of substance abuse.

MENTAL HEALTH AND SUBSTANCE USE

Anxiety and Substance Use

The literature supports a link between anxiety symptoms and drug use disorders. Often utilizing operant conditioning principles (applied to the use of alcohol and drugs), recent studies have conceptualized a "self-medicating" theory, whereby the substance use behavior is positively reinforced, thus increasing the likelihood it will occur again in the future. One such study examined the moderating effects of alcohol expectancies on tension reduction, level of anxiety symptoms, and drinking behavior in college men and found a strong association between anxiety symptoms and alcohol consumption among men with high tension-reduction outcome expectancies (Kushner, Sher, Wood & Wood,

1994). Grant and colleagues found high rates of comorbidity between alcohol and drug use disorders and anxiety disorders (Grant, Peterson, Dawson & Chou, 1994). Furthermore, data from the National Institute of Mental Health shows the lifetime prevalence of substance use disorders in patients diagnosed with an anxiety disorder to be approximately 23.7% (Regier, Farmer, Rae, Locke, Keith, Judd & Goodwin, 1990). This number rises to 35.8% when looking at substance use disorder rates in patients diagnosed with panic disorder (Regier et al., 1990). One note regarding interpretation of these findings, however, is that more recent investigations have found that anxiety disorders, while highly comorbid with alcohol and substance use disorders, typically follow rather than precede their development (Schuckit & Hesselbrock, 1995; Schuckit, Hesselbrock, Tipp, Nurnberger, Anthenelli, Crowe, 1995).

Traumatic Life Events

Adolescents who have experienced traumatic life events, including sexual, emotional, or physical abuse or neglect, are at considerably higher risk for illicit drug use than their non-abused peers (Clarke, Lesnick & Hegedus, 1997; Dansky, Brady & Roberts, 1994; Harrison, Fulkerson & Beebe, 1997). For instance, one study of 257 adolescents, aged 15-19 who met DSM-III-R criteria for drug dependence for at least one drug, found the participants' lifetime prevalence of Posttraumatic Stress Disorder (PTSD) was 29.6 percent, and current prevalence of PTSD was 19.2 percent (Deykin & Buska, 1997). One explanation of this phenomenon is that children who have been abused or neglected in some way suffer from an abnormally poor self-image, and they use drugs to cope with the emotional pain of the abuse or the subsequent self-derogation (Dembo,

1987). Regardless of the mechanism, however, traumatic life events are associated with a high risk of drug use.

Other Psychological Problems and Drug Abuse

Numerous studies have investigated the influence of psychological distress on adolescent drug use (Moncher, Holden & Schinke, 1991), but there is some discrepancy in the literature regarding the association between mental health and drug abuse. While some studies have found that psychological distress (including low self-esteem and depression) have tended not to be reliable or strong predictors of adolescent drug use (Schroeder, Laflin & Weis, 1993; Swaim, Oetting, Edwards & Beauvais, 1989), other studies have found contrary results. Hawkins and colleagues have found evidence for higher rates of psychopathology among drug users versus non-users when the drug users are young (Hawkins et al., 1992). Burkstein and colleagues reviewed the literature and found psychopathology rates tend to be disproportionately high among adolescents with drug abuse problems (Bukstein, Brent & Kaminer, 1989). Furthermore, a study of 1,285 randomly selected children and adolescents, aged 9-18, found that substance abuse was associated with an elevated likelihood of diagnosis for other psychiatric disorders (anxiety disorders, mood disorders, and disruptive behavior), even while controlling for socio-demographic characteristics such as age, gender, ethnicity, and socio-economic status (Kandel, Johnson & Bird, 1997). Various relationships have been proposed to explain this association, such as drug use inducing psychopathology in vulnerable individuals or drug use being a form of self-medication (Dixon, Haas, Weiden, Sweeney

& Frances, 1991; Meyer, 1986). In summary, mental health problems may well be a significant risk factor for adolescent drug abuse.

VARIABLES ASSOCIATED WITH THE PROGRESSION OF SUBSTANCE USE

Whereas the aforementioned variables are either clearly or potentially associated with an increased likelihood of substance use problems, there is no evidence that they are responsible for the progression of one substance of abuse to another. There is, however, evidence that peer relationships and personality factors are instrumental in determining which users of one drug of abuse, such as marijuana, will continue on to use other, and potentially more harmful, drugs.

Peer Influence

Association with peers who use drugs is one of the strongest non-genetic predictors that an adolescent will use drugs (Brook, Brook, Gordon, Whiteman & Cohen, 1990; Fergusson, Horwood & Lynskey, 1995; Swadi, 1992). Specific predictors of adolescent drug use include amount of drug use by peers, drug-related attitudes of peers, perceived use of drugs by others, and perceived support for drug use by peers. For instance, a study of 873 fifth to eighth graders found that 28 percent had used psychoactive substances during the last 4 months, and that association with a drug using peer had twice as much influence on drug use as an adolescent's own favorable attitude toward drug use (Reid, Martinson & Weaver, 1987). Another study of two cohorts of adolescents found that peer support was positively related to substance use, while parental and other adult support was inversely related to substance use (Wills & Vaughn,

1989). Furthermore, a path analysis of 415 eleventh and twelfth grade students showed peer drug association is the most proximal predictor of drug use, when compared to other socialization characteristics such as family strength, family sanctions, religious identification, and school adjustment (Oetting & Beauvais, 1987).

One potential explanation of these findings is through a combination of behaviorist and cognitive learning theories of substance abuse (Akers, Krohn, Lanza-Kaduce & Radosevich, 1979; Petraitis, Flay & Miller, 1995). One approach asserts that the decision to get involved in substance use is influenced, at least in part, by the user's belief regarding the cost-benefit ratio of substance use. As positive attitudes towards substance use are formed (i.e. by the endorsement of people around the potential user), the likelihood of using substances increases. If the user enjoys the experience, he or she is again more likely to use in the future.

There is also evidence that peer influence may be related to the progression from one drug of abuse to another. A study of 2,229 randomly selected eighth, tenth, and twelfth grade students found the strongest correlates of drug use across all grades was affiliation with drug using friends (Jenkins, 1996). Furthermore, Jenkins asserted peer affiliation is associated with not only initiation into substance use, but is also a strong predictor of moving on to using hard drugs. Step-wise multiple regression analyses showed that friends' drug use explained a significant proportion of the variance in self-reported frequency of drugs used after marijuana, such as stimulants and opiates. Unlike the variables mentioned earlier, such as gender, SES, etc., which are merely associated with substance use and abuse, affiliation with drug using peers may be one of the factors involved in the progression from one drug of abuse to another.

Personality and Substance Use

Research on personality variables related to substance use has a long history, but the theory of a single personality constellation associated with substance abuse has largely been discarded (Davison & Neale, 1990; Price, 1999). Nonetheless, research attempting to identify antecedent and concomitant personality factors associated with substance use has continued. One cluster of personality characteristics that has emerged from this work is variables correlated with antisocial behavior. Jones (1968) found that antisocial personality disorder (ASPD) was almost always co-morbid with alcohol dependence. A more recent model describes a general, broad-based personality risk for disinhibited behavior in men (Patterson & Newman, 1993). In this model, neurotic extraverts, who have an active, reward-seeking personality style, are more likely to pursue reward than to avoid punishment when both options are available, and this almost invariably takes the form of substance use. Kopstein's (1999) findings supported the hypothesis that the sensation-seeking personality variables of behavioral disinhibition and thrill and adventure seeking are major risk factors for substance use among adolescents. Even in multivariate models controlling for additional well-documented risk factors for substance use, behavioral inhibition was the most consistent and explanatory variable investigated in the study.

In addition to the above reported findings, LeMarquand, Benkelfast, Pihl, Palmour and Young (1999) found that impulsivity and behavioral disinhibition are strongly linked to alcoholism. In a study by Gabel, Stallings, Schmitz, Young, and Fulker (1999), all participants completed a personality questionnaire and were interviewed on several measures, including structured interviews for psychopathology

and substance misuse. The findings indicated that novelty seeking (NS) was significantly correlated with substance misuse in adolescent probands, adolescent controls, and proband fathers and mothers. Regression analyses that included conduct disorder (CD) or ASPD symptoms indicated that both NS and CD or ASPD symptoms made significant contributions to the prediction of substance misuse in treatment group probands and in their fathers and mothers. These findings clearly demonstrate that factors associated with antisocial behavior, especially the lack of behavioral inhibition, are strongly related to substance use.

Personality, similar to peer influence, may also be involved in the progression of substance use. McGue, Slutske and Iacono (1999) investigated the association between behavioral disinhibition and alcoholism versus drug use disorders. Personality was assessed by the Multidimensional Personality Questionnaire and substance use diagnoses were based on standard criteria as assessed by interview. Previous research in this area had failed to control for comorbid drug use disorders when looking at personality correlates of alcoholism, and the authors believe this was a consequential omission. Using a 3-factor (Gender X Alcoholism X Drug use disorder) MANOVA, their findings suggested that elevated levels of behavioral disinhibition observed with alcoholic individuals may be attributable to a subset of alcoholics who also use drugs other than alcohol. In other words, alcoholics with antisocial personality traits may be the ones who also have problems with hard drugs, whereas alcoholics without this personality type do not go on to use or abuse other drugs.

SUMMARY AND PROPOSED STUDY

The etiology of substance use in adolescents is a complex and multiply-determined phenomenon. Several theories have been put forth to try to explain portions of the variance, and several variables are associated with an increased risk for substance use and abuse. There is evidence that two of these variables, peer influence and personality related to behavioral disinhibition, may be related to the progression of one drug of abuse to another. The author could find no studies to date that have attempted to specifically determine if peer influence or personality variables related to antisocial behavior might help clinicians identify which users of one drug, such as marijuana, are at risk for using or abusing other illicit drugs.

The current study will attempt to learn more about selected potential moderators of the progression from marijuana to other illicit drugs. Although there is evidence that peer influence and personality variables are important in determining which users of marijuana will go on to use harder drugs, the evidence is fairly limited at this point, and these moderator relationships have never been directly tested. Hierarchical logistic regression analyses will be used to test the hypotheses that peer influence and personality variables moderate the association between marijuana use and other illicit drug use, while controlling for other variables associated with substance use, such as family factors and psychological distress. At the conclusion of this analysis, we will hopefully have a better understanding of why some adolescents utilize, and potentially have problems with, other drugs after using marijuana, while some do not experience these negative effects.

Chapter 2: *Method*

SUBJECTS AND PROCEDURES

Two hundred and sixty-six participants were recruited for the study from the University of Texas at Austin. All participants were current university students, aged 18 or older, and were paid research credit for their time spent completing the study, which averaged approximately one hour per participant. All students enrolled in Introductory Psychology at the University of Texas must complete five hours of research credit per semester, and participants for this study were recruited via sign-up sheets on the Department of Psychology web site.

Participants who signed up for the study were told when and where to meet the experimenter. Participants filled out questionnaire packets in a classroom in (or near) the Department of Psychology, and there were between one and ten participants per session. When they arrived in the classroom, all participants were given consent forms to sign, and any participants that did not want to participate after reading the consent form were excused. All participants were informed as to the nature of the study and that they may refuse or discontinue participation at any time without penalty. They were also informed that all responses were strictly confidential. Once all consent forms were returned to the experimenter, participants were given the questionnaire forms. They were instructed not to write any identifying information on their questionnaires, thus ensuring there was no way to link any respondent or his or her consent form to his or her questionnaires.

MEASURES

A pilot study was conducted to determine which measures would be administered in the final, large study and to avoid the use of a "shotgun" approach, in which a plethora of measures would be used. The variables that were determined to have the strongest associations with substance were then used as covariates in the final, large study analyses. In the pilot study, 50 participants filled out a substantial questionnaire battery (12 different questionnaires were included) which assessed demographics, family background, personality, and psychiatric history. Following the regression model-building strategy outlined by Hosmer and Lemeshow (2000), univariate and multivariate examination of the subscales of each questionnaire with the amount of substances used by each respondent determined which variables had the strongest associations with substance use. Variables associated with substance use that had a p-value of less than 0.25 in the univariate analyses, as well as variables with strong theoretical associations to substance use (e.g. potentially meaningful interactions), were selected for inclusion in the multivariate analyses.

Five subscale variables met the Hosmer and Lemeshow criteria, which were the Evaluation of Past Physical Punishment scale from the Discipline Questionnaire, the Permissive and Authoritative subscales from the Parental Authority Questionnaire, total score from the Beck Depression Inventory, and the total score from the Beck Anxiety Inventory. These variables were then entered into a multivariate model where they were regressed on total amount of substance use. In addition, two logistic multivariate regression models were analyzed where the same variables were regressed on dependent variables of zero or one, which were determined by whether respondents never used illicit

drugs other than marijuana (dependent variable score of "0") or have used illicit drugs other than marijuana (dependent variable score of "1") in the first logistic regression, and determined by whether respondents used illicit drugs two times or less in their life (dependent variable score of "0") or more than two times (dependent variable score of "1") in the second logistic regression. These cutoffs were determined by analysis of the distribution of illicit drug use in the pilot sample. Due to only five variables being included in the multivariate models, stepwise selection processes were not employed. In each of these multivariate models, only the BAI score was significantly associated with substance use, while all other variables were not significantly associated with any of the measures of substance use. Each of the other four variables were used in the final model, however, because of their potential covariate effect based on the univariate results and because of their theoretical value.

This process determined the variables to be included in the questionnaire battery given to the 266 full study participants and were used as covariates in this study to understand more about moderators of the association between marijuana and other drug use. Measures of family history of substance use, hopelessness, worry, anxiety sensitivity, and fear did not meet the Hosmer and Lemeshow criteria for inclusion and were not included in the analyses of the 266 full study participants. Participants completed demographic information including age, gender, ethnicity, and year in school (Appendix A). They also filled out the Discipline Questionnaire (Appendix B; Graziano & Namaste, 1990) to assess parental use of physical punishment. The Discipline Questionnaire is a 19-item, primarily Likert-scale designed to measure personal histories with physical punishment while growing up. Likert-scale items use a five point scale and

response values are averaged. This scale has been found to have good test-retest reliability and adequate internal consistency. Parenting styles (authoritative, authoritarian, indulgent, or indifferent) were measured using Buri's (1991) Parental Authority Questionnaire (Appendix C). This is a 30-item Likert-scale instrument that assesses adolescents' perceptions regarding parenting styles of their caretakers while growing up. This measure has also been found to have excellent test-retest reliability (correlations range from .77 to .92 for the different subscales) and good internal consistency (alphas range from .74 to .87 for the different subscales).

Information regarding peer substance use was obtained through the Peer Drug Associations (PDS; Appendix D) subscale of the American Drug and Alcohol Survey (ADAS; Oetting, Swaim, Edwards & Beauvais, 1989). The PDS is a 17-item subscale that asks about the number of friends using substances, whether friends have asked the adolescent to try substances, how strongly the adolescent would try to prevent friends from using substances, and how strongly friends would try to stop the adolescent's substance abuse. Reliability coefficients of 0.91 and 0.85 have been obtained using two different adolescent samples, one predominantly white (87 percent) and one American Indian (100 percent; Oetting, Swaim, Edwards and Beauvais, 1989). The Sensation Seeking Scale Form V (SSS-V; Zuckerman, Eysenck & Eysenck, 1978) was used as a measure of personality. The SSS-V is a 40-item measure of respondents' likelihoods and desires to engage in sensation-related behavior, and all questions are measured on a five point Likert scale. The SSS-V has been found to have satisfactory internal reliability (alpha coefficients of 0.85 for males, 0.87 for females) and is divided into four sub-scales: Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom

Susceptibility (Eysenck and Haapasalo, 1989; Appendix E). The Misbehavior Inventory (MBI; Appendix F), a 52-item questionnaire, was used to assess the number of times antisocial acts have been committed by each respondent, as well as the number of times each participants has used each different class of drugs (this measure does not provide information about the timing of different classes of drugs used). Participants write in the number of times they have engaged in these various antisocial and drug using behaviors. The Big Five Inventory (BFI; Benet-Martinez and John, 1988; Appendix G) was used to assess five important aspects of personality, Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. The BFI is a 44-item measure of various personality constructs that also utilizes a five point Likert scale rating. This measure has been found to have satisfactory reliability (John and Srivastava, 1998).

Additionally, the Beck Depression Inventory-II (BDI-II; Appendix H; Beck, Steer, Ball & Ranieri, 1996) was administered as a measure of each participant's current level of depression and sadness. The BDI-II is a 21-item scale where responses are coded zero through three, depending on respondents' current levels of depression and sadness. The BDI-II has been found to have a high level of internal consistency (Chronbach coefficient of .92) and to have good convergent validity for assessing self-reported depression (Krefetz, Steer, Gulab & Beck, 2002). Finally, the Beck Anxiety Inventory (BAI; Appendix I; Steer & Beck, 1997) was administered as a measure of general anxiety for each participant. Similar to the BDI-II, The BAI is a 21-item scale where responses are coded zero through three, depending on respondents' current levels of anxiety in various areas of their lives. The BAI has generally been found to have high internal consistency (Cronbach coefficient alpha > .90), adequate test-retest reliability (rs>.60),

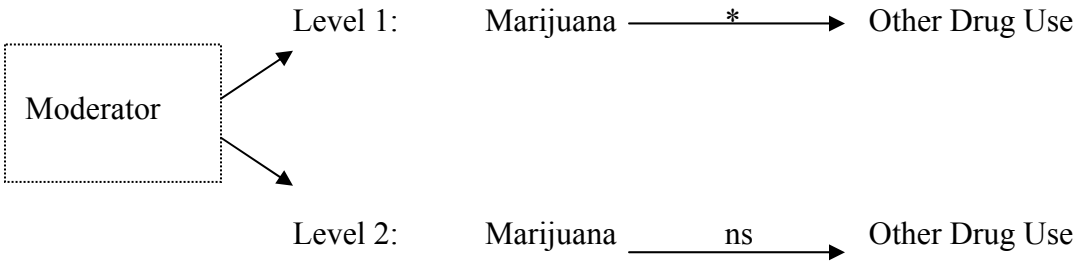
and moderate to high convergent validity (rs>.50) with other self-report and clinical rating scales of anxiety (Steer & Beck, 1997).

DATA ANALYSIS AND HYPOTHESES TO BE TESTED

Hypothesis 1

Hierarchical logistic regression analyses were used to test the hypotheses that peer influence and personality variables moderate the association between marijuana use and other illicit drug use. Statistical moderation occurs when an observed relationship is different at different levels of a third variable; in other words, the effect of a variable on an outcome is altered (i.e., moderated) by another variable. Following guidelines outlined by Baron and Kenny (1986) and Rogosch, Chassin, and Sher (1990), variables associated with substance use from the pilot sample, such as parenting styles and depression and anxiety, were entered into the first step of the regression equation in order to statistically control for any effect these variables may have on the association between marijuana and other drug use. Participant reports of illegal drug use were regressed onto their reports of marijuana use and their scores from peer influence and personality measurements in Step 2, and the interaction between marijuana use and peer affiliation and personality scores in Step 3. If the interaction term added a significant amount of variance to the prediction of illicit drug use, then the hypotheses that peer influence and/ or personality moderate the association between marijuana use and other illicit drug use would be supported. Additionally, the interaction terms were divided into quartiles when examined to help account for the anticipated non-normal distribution of these terms.

Figure 1**:** Example of statistical moderation. The effect of marijuana on other drug use is different at different levels of the moderator.



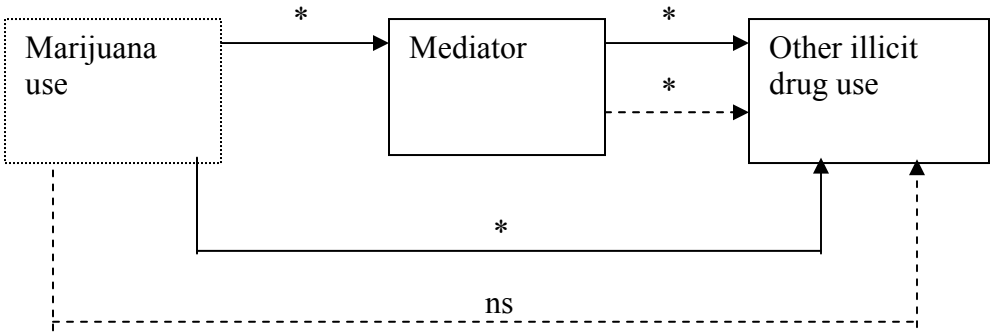
Hypothesis 2

Hierarchical logistic regression analyses were also used to test the hypotheses that peer influence and personality variables mediate the association between marijuana use and other illicit drug use. Statistical mediation occurs when a third variable provides a clearer interpretation of the relationship between two other variables. Mediation implies a causal hypothesis whereby an independent variable causes a mediator which causes a dependent variable. Again, following guidelines outlined by Baron and Kenny (1986) and Rogosch, Chassin, and Sher (1990), variables associated with substance use from the pilot sample, such as parenting styles and depression and anxiety, were entered into the first step of the regression equation in order to statistically control for any effect these variables may have on the association between marijuana and other drug use.

To test mediation, the following set of conditions needed to be met, which occurred in the second block of each regression analysis. First, marijuana use needed to be significantly associated with drug use; second, the peer influence or personality variable in question needed to be significantly associated with drug use; and third, marijuana use needed to be significantly associated with peer influence or the personality variable in question. Once this set of conditions was met, mediation was tested by

simultaneously regressing marijuana use and either peer influence or personality onto drug use. If the potential mediator, peer influence or personality, was still significantly associated with drug use while marijuana use was no longer significantly associated with drug use in the analysis, then that suggested the variance in the association between marijuana use and other drug use is accounted for by the mediator, and would support the hypothesis that peer influence and/ or personality mediates the association between marijuana and other drugs.

Figure 2**:** Example of statistical mediation. First step analyses are statistically significant (represented by solid lines), but in second step mediation analysis, the mediator is significantly associated with outcome, whereas original predictor is no longer significantly associated with outcome (represented by dashed lines).



Hypothesis 3

Regression analyses were also be used to determine which variables predicted the onset of illicit drug use. It was hypothesized that the pilot study variables (parenting styles, discipline, depression, and anxiety) would be significantly associated with the onset of marijuana use. It was also predicted that only personality and peer influence

would be associated with the onset of other illicit drug use (heroin, cocaine, other stimulants, ecstasy, hallucinogens), whereas the other independent variables would not.

Hypothesis 4

Finally, drug use probabilities were computed and 2X2 Chi-square tests for independence were examined to determine the order in which the drugs are being used by the participants in the study. Probabilities were calculated by examining percentages of various drug usage, given marijuana use. For instance, the probability of heroin use, given marijuana use, was calculated by dividing the number of users of both marijuana and heroin by the total number of marijuana users. Two-by-two contingency tables and a chi-square test of independence were examined, where a significant chi-square value would indicate that heroin use and marijuana use are not independent and the relative proportions of use would clearly suggest which drug is the pre-cursor of the other.

Chapter 3: *Results*

PRE-ANALYSIS PREPARATION

Information from questionnaires were entered in an SPSS database and once all data were entered, the primary researcher checked the data entry (completed by undergraduate research assistants) against the hard copies of the questionnaires. Using the NORM software developed by Joe Schafer, missing values were calculated and inserted where appropriate via the use of multiple imputation (Schafer, 1997). Multiple imputation is the currently most widely accepted approach for handling missing data, and employs maximum likelihood estimations of missing values. If a value was imputed that fell outside the possible range for a particular question, the value was deleted and reassigned to missing.

Once missing values were imputed and scales and subscores were computed, independent and dependent variables were examined to see if they met the regression assumption of normality. The primary dependent variable, the total number of times illicit drugs other than marijuana were used (Mean=13.69, SD=44.57, Range=0-390), was not normally distributed. Recoding the variable into quartiles revealed a break between participants who had used illicit drugs zero to five times in their lives and six or more times. Based on this analysis, as well as theoretical considerations, two binary dependent measures were calculated and used in subsequent analyses. One binary dependent measure was assigned a value of "0" for participants who never used drugs, and a "1" for those who reported using one or times in their lives. A frequency analysis of this binary

dependent measure revealed that 115 participants had never used an illicit drug other than marijuana, and 104 participants had used at least one illicit drug. A second binary dependent measure was assigned a value of "0" for participants who reported using illicit drugs zero to five times in their lives, and a value of "1" for those that reported using six or more times in their lives. A frequency analysis of this binary dependent measure revealed that 164 participants had used an illicit drug other than marijuana zero to five times, and 55 participants had used illicit drugs six or more times.

Independent variables were also examined for normality. Several variables, including number of times participants reported using marijuana and the total number of times participants engaged in antisocial acts, were divided into quartiles (which did not deviate significantly from normal) for subsequent analyses. Variables that did not violate the assumption of normality were left unchanged from their calculated scale or subscale scores for subsequent analyses.

DEMOGRAPHICS

Two-hundred and sixty-six respondents signed up for and completed the questionnaire battery. Of these participants, two-hundred and nineteen respondents reported using marijuana at least once, and only these respondents' questionnaires were used to test Hypotheses One through Three. The total sample was 47.4 percent female and averaged 19.01 years of age (SD=1.94). Additionally, 66.5 percent of the sample identified as Caucasian or white, 13.9 percent identified as Hispanic or Latina/o, 12.8 percent identified as Asian, 4.5 percent identified as African-American or black, and 2.3 percent reported identifying as another race. First year students comprised 62.4 percent

of the sample, with 24.4 percent identifying as second year students, 9.0 percent as third year, 2.4 percent as fourth year, 0.4 percent as fifth year students, and 0.4 percent as graduate students.

For the portion of the sample who used marijuana at least one time, 49.3 percent were female and the average age was 18.94 years (SD=1.59). Additionally, sixty-three percent of this portion of the sample identified as Caucasian or white, 25.6 percent identified as Hispanic or Latina/o, 11 percent identified as Asian, 2.7 percent identified as African-American or black, and 2.3 percent reported identifying as another race. Due to the small percentage of minority participants, especially African-American participants, differences in substance use between different racial groups were not examined. First year students comprised 70.08 percent of the marijuana-using sample, with 13.2 percent identifying as second year students, 2.7 percent as third year, 11.0 percent as fourth year, and 2.3 percent as fifth year students. There were no participants that identified as graduate students in the marijuana-use portion of the sample (see Table 1).

Table 1: Demographic data of the participant sample.

	Total Sample	Marijuana Users	Other Illicit Drug Users
% Caucasian	66.5	63.0	72.1
% Latina/o	13.9	25.6	17.3
% African-American	4.5	2.7	1.9
% Asian	12.8	11.0	6.7
% Other	2.3	2.3	1.9

HYPOTHESIS TESTING

Moderators of the Association Between Marijuana Use and Other Drug Use

The first hypothesis predicted that peer influence and personality variables would moderate the association between marijuana use and other illicit drug use. Several hierarchical regression analyses were conducted to test this hypothesis, where the interactions of peer and marijuana use, as well as personality and marijuana use, were regressed onto the binary dependent variables (described above). For each analysis, the covariates determined by the pilot study analyses were entered into the first block of the regression equation. The primary independent variables, marijuana use and peer influence and marijuana use and personality variables, were entered into the second block, respectively. Interactions of peer and marijuana use and of personality and

marijuana use were then entered into the third block of the analysis, respectively. If the interaction term added a significant amount of variance to the prediction of illicit drug use, based on the change in R^2 from Block 2 to Block 3, then the hypotheses that peer influence and/ or personality moderate the association between marijuana use and other illicit drug use would be supported.

The first analysis examined peer influence as a moderator between marijuana use and the two binary dependent variables. The covariates were entered in Block 1, peer influence and marijuana use in Block 2, and the interaction between peer and marijuana use in Block 3. When the binary dependent variable was coded as "0" for no drug use and "1" for any drug use, results revealed none of the covariates as significantly associated with drug use (odds ratio ranges from 0.83 to 1.04). Peer influence (Exp(B)=1.13, $p<.001$) and marijuana use (Exp(B)=2.72, $p<.001$) were both significantly associated with drug use. The interaction of peer and marijuana use was calculated and multiplying the ADS subscale score from the PADAS with the quartile-recoded measure of marijuana use and then this product was itself was then recoded into quartiles. This interaction term, however, was not significantly associated with reported drug use (Exp(B)=0.68, $p=0.67$) and the R^2 change from Block 2 to Block 3 was 0.001 ($p>.05$; see Table 2).

Table 2: Regression analysis of peer influence as a moderator of the association between marijuana use and other drug use (measure 1).

Predictors	R^2 change	Odds Ratio (Exp(B))
Main effects: Peer influence Marijuana use		 1.13* 2.72*
Peer X Marijuana interaction	0.001	0.68

* $p<0.001$

Similar results were obtained when the dependent variable was coded "0" for participants who used drugs five or fewer times and "1" for participants who reported using drugs six or more times. One covariate, parental authoritativeness, was significantly associated with drug use (Exp(B)=0.95, $p<.05$), but none of the other covariates were. Again, both peer influence (Exp(B)=1.20, $p<.001$) and marijuana use (Exp(B)=2.71, $p<.001$) were significantly associated with drug use. The interaction of peer and marijuana use was again not significantly associated with reported drug use (Exp(B)=1.02, $p=0.71$) and the R^2 change from Block 2 to Block 3 was 0.001 ($p>.05$; see Table 3). Neither of these two analyses supported peer influence as a moderator of the association between marijuana use and other drug use.

Table 3: Regression analysis of peer influence as a moderator of the association between marijuana use and other drug use (measure 2).

Predictors	R^2 change	Odds Ratio (Exp(B))
Main effects: Peer influence Marijuana use		 1.20* 2.71*
Peer X Marijuana interaction	0.001	1.02

* $p<0.001$

Similar analyses were conducted using various measures of personality to determine if personality moderated the association between marijuana and other drug use. A composite score for sensation seeking was computed using the subscales from the Sensation Seeking Questionnaire. Interactions were again examined using quartiles of the interaction product, calculated using the same method as with peer and marijuana use. Using the first binary dependent variable ("0" for no drug use, "1" for any drug use) no covariates were associated with drugs, marijuana use (Exp(B)=3.36, $p<0.001$) was associated with drug use, but sensation seeking (Exp(B)=0.99, $p=0.41$) was not. The interaction of sensation seeking and marijuana use was not significantly associated with reported drug use (Exp(B)=1.29, $p=0.57$) and the R^2 change from Block 2 to Block 3 in this analysis was 0.002 ($p>.05$; see Table 4).

Table 4: Regression analysis of sensation seeking as a moderator of the association between marijuana use and other drug use (measure 1).

Predictors	R^2 change	Odds Ratio (Exp(B))
Main effects: Sensation seeking Marijuana use		 0.99 3.36*
Sensation seeking X Marijuana interaction	0.002	1.29

* $p<0.001$

The same analysis was conducted using the second dependent variable ("0" for five or fewer times using drugs, "1"for six or more times) with similar results. Again, parental authoritativeness was associated with drugs, (Exp(B)=0.95, $p<.05$), and marijuana was as well (Exp(B)=3.87, $p<.001$) and sensation seeking was not (Exp(B)=0.99, $p=0.19$). Similar to the previous analysis, the interaction was not significantly associated with drug use (Exp(B)=0.82, $p=0.72$) and the R^2 change from Block 2 to Block 3 was 0.001 ($p>.05$; see Table 5). These results do not support sensation seeking as a personality variable that moderates the association between marijuana use and other drug use.

Table 5: Regression analysis of sensation seeking as a moderator of the association between marijuana use and other drug use (measure 2).

Predictors	R^2 change	Odds Ratio (Exp(B))
Main effects: Sensation seeking Marijuana use		 0.99 3.87*
Sensation seeking X Marijuana interaction	0.001	0.82

* $p<0.001$

Similar analyses were conducted for the other measures of personality from the Big 5 Questionnaire. Using the same techniques as described above, personality variables of openness, emotional stability, extraversion, agreeableness, and conscientiousness were examined as potential moderators of marijuana use and drug use. None of the interactions between these variables and marijuana use added a significant amount of variance in Block 3 of the regression onto drug use (see Table 6).

Table 6: Regression analyses of Big 5 Questionnaire personality variables as moderators of the association between marijuana use and other drug use (measure 1).

Predictors	R^2 change	Odds Ratio (Exp(B))
Extraversion X Marijuana interaction	0.008	1.06
Agreeableness X Marijuana interaction	0.001	1.01
Conscientiousness X Marijuana interaction	0.005	1.06
Emotional Stability X Marijuana interaction	0.00	1.02
Openness X Marijuana interaction	0.00	1.00

A final measure of personality was examined, which was the number of times each respondent committed antisocial acts in their lives. This variable, like the measure of marijuana use, was recoded into quartiles to account for the non-normality of its distribution. Using the same analytical techniques as described above, the covariates and marijuana use mirrored the results as described above. The number of antisocial acts was not significantly associated with drug use (Exp(B)=1.19, p=0.29 for the first dependent variable, Exp(B)=1.22, p=0.27 for the second dependent variable) and the interaction between antisocial acts and marijuana use (also recoded into quartiles) was not significantly associated with drug use (Exp(B)=1.45, p=0.54, R^2 change=0.002 for the

first dependent variable, Exp(B)=2.26, p=0.23, R^2 change=0.01 for the second dependent variable). Thus neither peer influence nor any of the personality variables examined in this study moderated the association between marijuana use and other drug use (see Tables 7 and 8).

Table 7: Regression analysis of antisocial acts as a moderator of the association between marijuana use and other drug use (measure 1).

Predictors	R^2 change	Odds Ratio (Exp(B))
Main effects: Antisocial acts Marijuana use		 1.19 3.32*
Antisocial acts X Marijuana interaction	0.002	1.45

* p<0.001

Table 8: Regression analysis of antisocial acts as a moderator of the association between marijuana use and other drug use (measure 2).

Predictors	R^2 change	Odds Ratio (Exp(B))
Main effects: Antisocial acts Marijuana use		 1.22 3.93*
Antisocial acts X Marijuana interaction	0.01	2.26

* p<0.001

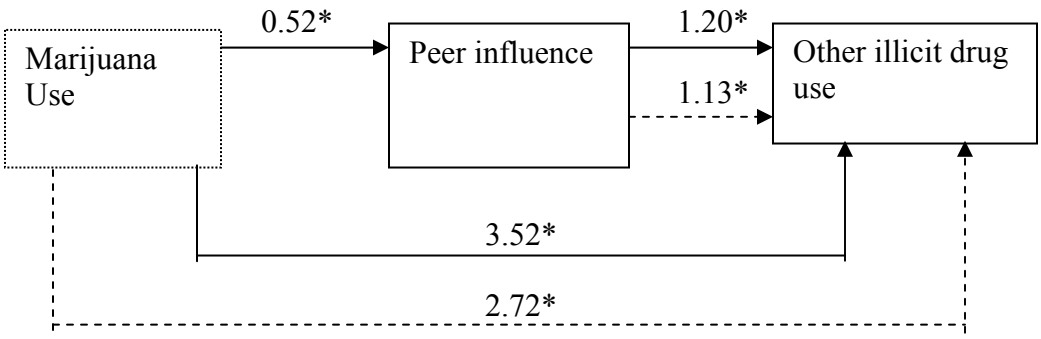
Mediators of the Association Between Marijuana Use and Other Drug Use

The second hypothesis predicted that peer influence and personality variables would mediate the association between marijuana use and other illicit drug use. Hierarchical regression analyses were also conducted to test this hypothesis, and for each analysis, the covariates determined by the pilot study analyses were again entered into the first block of the regression equation. To test mediation, a primary set of conditions needed to be met during the process of each analysis. First, marijuana use needed to be significantly associated with drug use; second, the peer influence or personality variable in question needed to be significantly associated with drug use; and third, marijuana use would need to be significantly associated with peer influence or the personality variable in question. Once this set of conditions was met, mediation was tested by simultaneously regressing marijuana use and either peer influence or personality onto drug use. If the potential mediator, peer influence or personality, was still significantly associated with drug use while marijuana use was no longer associated with drug use in this analysis, then that would suggest the variance in the association between marijuana use and other drug use was accounted for by the mediator, and would support the hypothesis that peer influence and/ or personality mediates the association between marijuana and other drugs.

The first mediation model tested peer influence as a mediator of the association between marijuana use and other drugs. The first step was to regress marijuana use on the binary dependent variable coded "0" for no drug use and "1" for any drug use in the second block of the logistic regression equation. As shown in Figure 1, marijuana was significantly associated with drug use, Exp(B)=3.52, $p<.001$, $R^2=.40$. Next, peer influence was regressed onto the same measure of drug use in the second block of a

separate regression analysis. Peer influence was also significantly associated with drug use, Exp(B)=1.20, p<.001, R^2=.33. Next, marijuana was regressed onto peer use in the second block of a hierarchical linear regression where covariates were again entered into the first block. Marijuana was also significantly associated with peer influence, β= .52, p<.001, Adjusted R^2=.26. Because all of these associations were statistically significant, the first set of conditions for testing a mediation model were met. The next analysis examined simultaneous regression of marijuana use and peer influence on illicit drug use, again in the second block of a logistic regression. Consistent with the hypothesis, peer influence was still significantly associated with drug use, Exp(B)=1.13, p<.001, but contrary to the hypothesis, so was marijuana use, Exp(B)=2.72, p<.001. These results do not support the hypothesis that peer influence mediates the association between marijuana use and other illicit drug use.

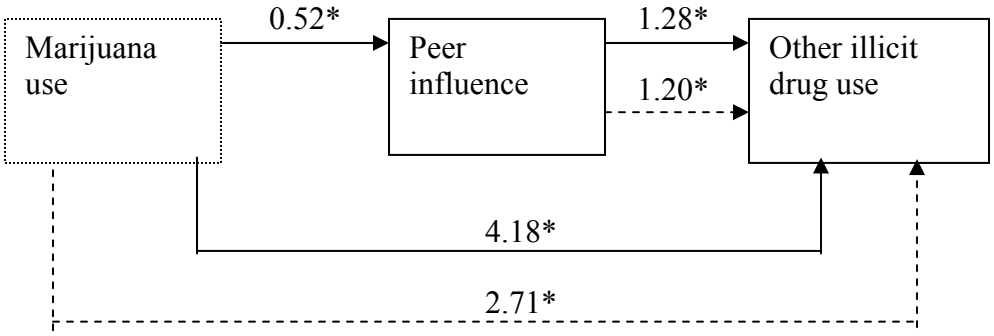
Figure 3**:** Regression analyses of peer influence as a mediator of the association between marijuana use and other drug use (measure 1). Solid lines represent first step and dashed lines represent second step in mediator analyses (values are odds ratios or standardized beta estimates, *p<0.001).



Very similar analyses were conducted to determine if peer influence mediates the association between marijuana and other drugs when the other binary dependent measure

of illicit drug use was employed (coded "0" for five or fewer times using drugs, "1" for six more time using). Conducting the same regression analyses as described above but substituting this other measure for drug use, marijuana was again significantly associated with drug use, Exp(B)=4.18, p<.001, R^2=.39, peer influence was again associated with drug use, Exp(B)=1.28, p<.001, R^2=.42, and marijuana use was significantly associated with peer influence, β= .52, p<.001, Adjusted R^2=.26. Once again, the primary set of conditions for testing a mediator relationship were met. When marijuana and peer influence were regressed simultaneously onto drug use, again both peer influence, Exp(B)=1.20, p<.001 and marijuana use, Exp(B)=2.71, p<.001 were significantly associated with other illicit drug use (see Figure 4). These results also do not support the hypothesis that peer influence mediates the association between marijuana use and other drugs.

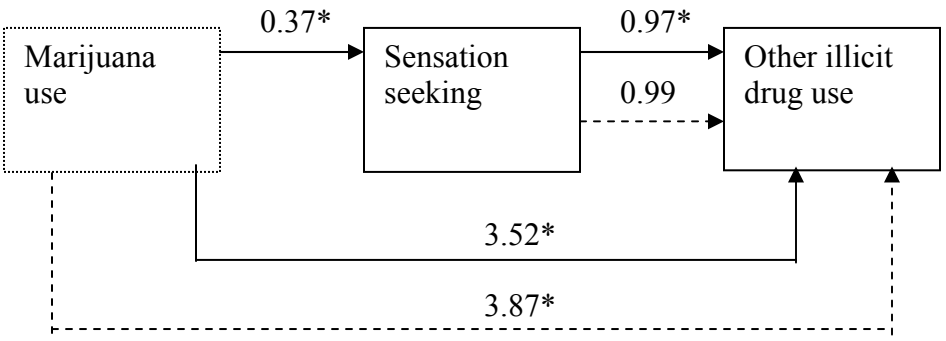
Figure 4**:** Regression analyses of peer influence as a mediator of the association between marijuana use and other drug use (measure 2). Solid lines represent first step and dashed lines represent second step in mediator analyses (values are odds ratios or standardized beta estimates, *p<0.001).



Next, the hypothesis that personality mediates the association between marijuana use and other illicit drug use was tested. Following the guidelines used above, covariates were again entered into the first block of all regression equations. The first step was

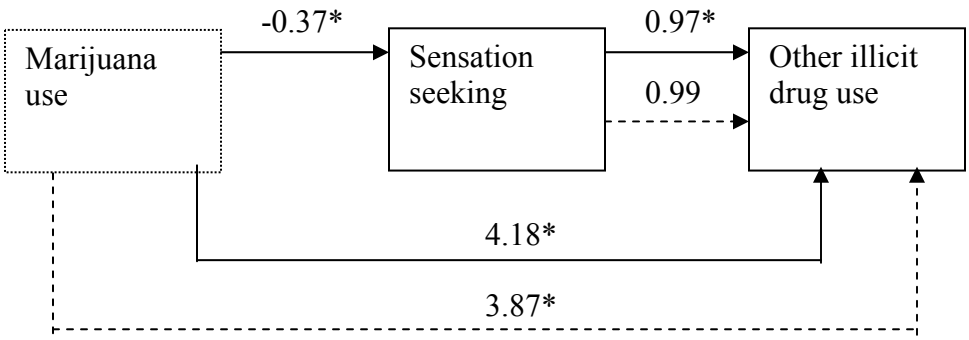
again to regress marijuana use onto the first binary dependent variable (coded "0" for no drug use and "1" for any drug use). As reported above, marijuana was significantly associated with drug use, Exp(B)=3.52, p<.001, R^2=.40. Next, the composite sensation seeking score (as used in the moderator analyses) was regressed onto the same measure of drug use in the second block of a separate regression analysis. Sensation seeking was also significantly associated with drug use, Exp(B)=0.97, p<.001, R^2=.14. Next, marijuana was regressed onto the personality measure of sensation seeking, which also revealed a significant association, β= -.37, p<.001, Adjusted R^2=.20. Because all of these associations were statistically significant, the first set of conditions for testing a mediation model were met once again. The next analysis examined simultaneous regression of marijuana use and personality on illicit drug use, again in the second block of a logistic regression. Contrary to the hypothesis, and sensation seeking was not significantly associated with drug use, Exp(B)=0.99, p=.41 and marijuana use was still associated with drug use, Exp(B)=3.87, p<.001 (see Figure 5).

Figure 5**:** Regression analyses of sensation seeking as a mediator of the association between marijuana use and other drug use (measure 1). Solid lines represent first step and dashed lines represent second step in mediator analyses (values are odds ratios or standardized beta estimates, *p<0.001).



The same regression models were then examined to determine if sensation seeking mediated the association between marijuana and other drugs when the second binary measure of drug use was used ("0" for five or fewer times using drugs, "1" for six or more times using). The first set of conditions for mediation were met again: sensation seeking was associated with drug use, Exp(B)=0.97, p<.001, R^2=.14, and as reported above, marijuana use was significantly associated with this measure of drug use and marijuana use was significantly associated with sensation seeking. In the simultaneous regression of sensation seeking and marijuana on this measure of drug use, however, sensation seeking was not significantly associated with drugs, Exp(B)=0.99, p=.19, and marijuana remained statistically significant, Exp(B)=3.87, p<.001 (see Figure 6). These results also do not support the hypothesis that sensation seeking personality mediates the association between marijuana use and other drug use.

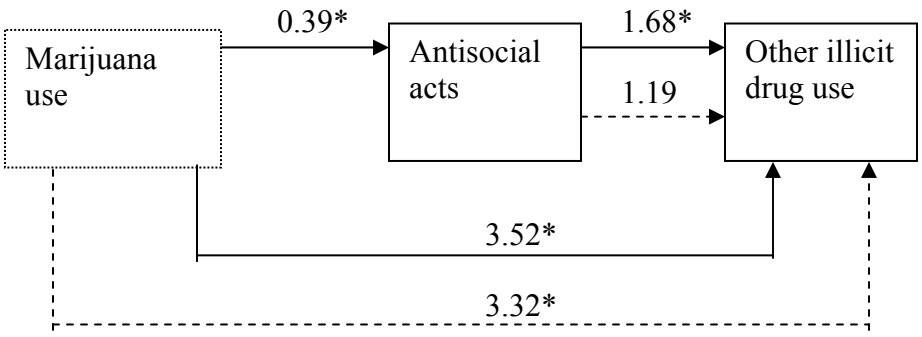
Figure 6**:** Regression analyses of sensation seeking as a mediator of the association between marijuana use and other drug use (measure 2). Solid lines represent first step and dashed lines represent second step in mediator analyses (values are odds ratios or standardized beta estimates, *p<0.001).



Finally, another measure of personality, the total number of times each participant engaged in antisocial acts (recoded into quartiles to account for this variable's lack of normal distribution) was tested as a mediator between marijuana and other drug use.

Following the process outlined above, this variable was tested as a mediator of the first binary dependent variable. The first set of conditions to test a mediation model were met, as antisocial acts were significantly associated with drug use, Exp(B)=1.68, p<.001, R^2=.15, marijuana use was associated with antisocial acts in a linear regression, β= .39, p<.001, Adjusted R^2=.20, and as reported above, marijuana was significantly associated with drug use. Again, the primary conditions of mediation were met. Marijuana and antisocial acts were then regressed onto drug use and a similar pattern shown in the sensation seeking mediation model were revealed. Antisocial acts were not significantly associated with drugs, Exp(B)=1.19, p=.29, but marijuana remained statistically significant, Exp(B)=3.32, p<.001 (see Figure 7). These results do not support personality as measured by antisocial acts as a mediator of the association between marijuana and other drugs.

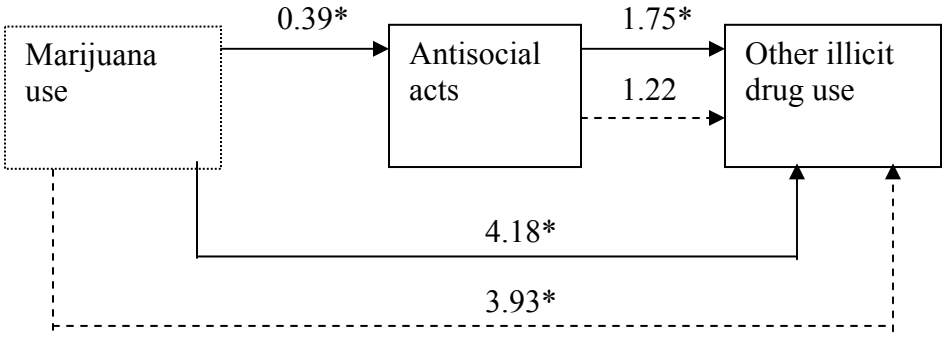
Figure 7**:** Regression analyses of antisocial acts as a mediator of the association between marijuana use and other drug use (measure 1). Solid lines represent first step and dashed lines represent second step in mediator analyses (values are odds ratios or standardized beta estimates, *p<0.001).



The same analyses were conducted examining antisocial acts as a mediator of the association between marijuana and the second binary measure of drug use. As shown in Figure 8, antisocial acts were again associated with this measure of drug use,

Exp(B)=1.75, p<.001, R^2=.13 and thus the primary conditions were met to test mediation (as reported above, marijuana was associated with antisocial acts and with this measure of drug use). The simultaneous regression of antisocial acts and marijuana use onto drug use revealed the same pattern as described above. Antisocial acts were not significantly associated with drugs, Exp(B)=1.22, p=.27, but marijuana remained statistically significant, Exp(B)=3.93, p<.001. These results consistently do not support personality or peer influence as mediators of the association between marijuana use and other illicit drug use.

Figure 8**:** Regression analyses of antisocial acts as a mediator of the association between marijuana use and other drug use (measure 2). Solid lines represent first step and dashed lines represent second step in mediator analyses (values are odds ratios or standardized beta estimates, *p<0.001).



Variables Related to the Onset of Illicit Drug Use

Multiple regression analyses were used to test the third hypothesis that the covariates as determined from the pilot study (discipline, parenting styles, depression, and anxiety) would be significantly associated with the onset of marijuana use, but that only personality and peer influence would be associated with the onset of other illicit drug use (heroin, cocaine, other stimulants, ecstasy, hallucinogens), whereas the

covariates would not. Using the quartile-recoded marijuana use variable as the dependent variable, the variables from the pilot study were regressed simultaneously onto marijuana use. As seen in the Table 9 below, none of these variables were associated with marijuana use.

Table 9: Associations between covariates and marijuana use.

Predictor	Standardized Beta Coefficient	Sig.
Evaluation of physical punishment	0.002	0.98
Parental permissiveness	0.12	0.10
Parental authoritativeness	-0.09	0.22
Depressive symptomology (Beck Depression Inv.)	-0.06	0.49
Anxious symptomology (Beck Anxiety Inv.)	0.10	0.26

As reported earlier, none of these variables was significantly associated with other illicit drug use, except for parental authoritativeness ($B=-0.05$, $p<0.05$) when the dependent variable was coded "0" for participants who used drugs 5 or fewer times and "1" for those who used 6 or more times (see Table 10).

Table 10: Associations between covariates and illicit drug use (other than marijuana).

Predictor	Odds Ratio for DV-1 "0"-Did not use "1"-Used drugs	Sig.	Odds Ratio for DV-2 "0"-Drugs <=5 "1" Drugs >5	Sig.
Evaluation of physical punishment	0.83	0.50	1.05	0.88
Parental permissiveness	0.97	0.30	0.99	0.81
Parental authoritativeness	0.97	0.24	0.95	0.04*
Depressive symptomology (Beck Depression Inv.)	1.04	0.08	1.01	0.85
Anxious symptomology (Beck Anxiety Inv.)	1.00	0.98	1.01	0.83

Also as reported earlier, peer influence was significantly associated with both codes of drug use, even when statistically controlling for the covariates (Exp(B)=1.13, p<.001 for DV-1, Exp(B)=1.20, p<.001 for DV-2). No measures of personality, however, were significantly associated with drug use.

Order in Which Drug Classes are Used

For Hypothesis 4, all participants who completed questionnaire batteries were included in the analyses. Percentages of participants who filled out the questionnaire batteries and used various classes of drugs were calculated. The percentage of participants in the sample who used alcohol was 95.49 (254 out of 266). For marijuana, the percentage of users was 82.33 (219 out of 266). The percentage of users in the sample for the other various class of drugs were 18.05 % for hallucinogens, 12.03 % for amphetamines, 4.51 % for sedatives and hypnotics, 1.88 % for heroin and other opiates, 9.40 % for cocaine, 15.41 % for ecstasy, and 32.33 % for prescription drugs (without a prescription; see Table 10). Furthermore, the percentage of participants who used marijuana but did not use any other drugs was 52.8 %. Twenty-one point one percent of participants used one illicit drug besides marijuana, 9.2 % used two drugs other than marijuana, 5.5 % of participants used three drugs other than marijuana, 4.1 % used five drugs, 5.5 % used six drugs, 1.4 % used seven different drugs, and 0.5 % used seven drug classes in addition to marijuana.

Furthermore, probabilities of the use of various drug classes were calculated, given use of another drug. First, the probability that a participant used marijuana, given that they used alcohol, was calculated by dividing the total number of users of both

alcohol and marijuana use (219) by the total number of alcohol users (254), which equaled 86.22 %. In other words, there is an 86.22 % chance a user of alcohol will also use marijuana. Next, probabilities of all other drug classes were calculated, given marijuana use. The probability of hallucinogen use, given marijuana use, was calculated by dividing the number of users of hallucinogens and marijuana (48) by the total number of marijuana users (219), which equaled 21.92 %. The chance a participant would use the other various classes of drugs, given marijuana use, was 14.61 % for amphetamines, 5.48 % for sedatives and hypnotics, 2.28 % for heroin and opiates, 11.42 % for cocaine, 18.72 % for ecstasy, and 37.90 % for prescription drugs (see Table 11).

Table 11: Percentage of users of various drug classes in total sample and odds of using, given marijuana use.

Drug	Percentage of users in sample	Odds of use given marijuana use
Hallucinogens	18.05 %	21.92 %
Amphetamines/ Stimulants	12.03 %	14.61 %
Sedatives/ hypnotics	4.51 %	5.48 %
Heroin/ opiates	1.88 %	2.28 %
Cocaine	9.40 %	11.42 %
Ecstasy	15.41 %	18.72 %
Prescription drugs	32.33 %	37.90 %

Next, the percent chance of using each class of drug, given no use of marijuana, was calculated. For instance, the chance of hallucinogen use in non-users of marijuana was calculated by dividing the total number of hallucinogen users (0) from the sample of participants who had not ever used marijuana (47), which equaled 0 %. The percent chance of using all other drug classes, given no use of marijuana, was also zero. There was one exception to this finding, which was that there were 3 users of prescription drugs with no history of marijuana use, equating to a 6.38 % chance of using prescription drugs given no marijuana use (see Table 12).

Table 12: Odds of using various drugs, given no marijuana use.

Drug	Odds given no marijuana
Hallucinogens	0 %
Amphetamines/ Stimulants	0 %
Sedatives/ hypnotics	0 %
Heroin/ opiates	0 %
Cocaine	0 %
Ecstasy	0 %
Prescription drugs	6.38 %

Next, 2X2 chi-square matrices were constructed to examine whether these percentages happened by chance and to help determine if marijuana use appears to precede the use of other drugs. For instance, Table 13 shows the Chi-square matrix for use of hallucinogens and marijuana. A 2X2 chi-square determined that hallucinogen use

and marijuana use are not independent (χ^2=12.57, p<.01, *w*=0.79). Using the argument that hallucinogen use and marijuana use are not independent of each other and that hallucinogen use never occurred in the absence of marijuana use, it logically follows that marijuana use precedes the use of hallucinogens. Similar matrices were constructed for the other classes of drugs with marijuana and the same chi-square tests for independence were conducted. Amphetamine use was also not independent of marijuana use (χ^2=7.80, p<.01, *w*=0.68), nor was prescription drug use (χ^2=17.57, p<.01, *w*=0.88), ecstasy use (χ^2=10.40, p<.01, *w*=0.75), nor cocaine (χ^2=5.93, p<.05, *w*=0.62). Consequently, marijuana use appears to precede the use of each of these categories of drugs. Heroin use was determined to be independent of marijuana use (χ^2=1.09, p>.05, *w*=0.29), as was sedative/hypnotics use (χ^2=3.15, p>.05, *w*=0.44), which suggests that no conclusion regarding the order of use between these drugs and marijuana may be asserted.

Table 13: A 2X2 Chi-square matrix of hallucinogen and marijuana use.

		Marijuana Use		
		Yes	No	Total
Hallucinogen Use	Yes	48	0	48
	No	171	47	218
	Total	219	47	266

Chapter 4: *Discussion*

In this research, data was gathered from over 200 marijuana users and over 250 people total to examine various factors regarding the relationship between marijuana and other drugs. The major findings and their implications are reviewed below.

HYPOTHESES

Peer Influence and Personality as Moderators and Mediators of the Association Between Marijuana and Other Drugs

The primary research hypotheses for this study, that peer influence and personality factors related to behavioral disinhibition would moderate the association between marijuana use and other illicit drug use, were not supported. In other words, the association between marijuana and other drugs was not found to be different at different levels of peer influence or personality. Furthermore, the hypotheses that peer influence and personality factors related to behavioral disinhibition would mediate the association between marijuana use and other illicit drug use, were also not supported. In other words, peer influence and personality are not variables that cause marijuana users to proceed to use other drugs. Though not consistent with the study hypotheses, the results of this study suggest that peer influence and personality are not the major factors that determine which users of marijuana will proceed to use or abuse other illicit drugs and which users of marijuana will not proceed to use or abuse other illicit drugs. The results also suggest that peer influence and personality related to behavioral disinhibition are not the mechanisms by which users of marijuana go on to use other illicit drugs.

In these analyses, reported marijuana use was consistently related to other reported illicit drug use, and peer influence was consistently significantly related to both reported marijuana use and to other illicit drug use. These results are consistent with the literature examining the effect of peer influence on substance use (Brook et al., 1990; Fergusson, Horwood & Lynskey, 1995; Swadi, 1992). The results of this study are also consistent with previous findings that peer influence does have an influence on the use of drugs, and extends these findings in terms of this influence not being differential between marijuana and other drugs. Whereas Jenkins (1996) found that friends' drug use explained a significant proportion of the variance in self-reported frequency of drugs used after marijuana (such as stimulants and opiates), a distinction cannot be made between marijuana and other drugs in terms of any influence peers may have on an individual's use. The variance in reported illicit drug use accounted for by peer influence in Jenkins' (1996) study may extend to the use of marijuana as well, which would be consistent with the results of the current study.

A similar, though slightly different pattern emerged regarding the association between personality and marijuana and other drug use. Sensation seeking personality (as defined by Zuckerman's construct of thrill and adventure seeking, seeking novel experience, behavioral disinhibition, and boredom susceptibility) and antisocial behavioral acts were consistently significantly associated with both reported marijuana and drug use when these variables were singularly regressed onto the drug use variables. These findings are consistent with earlier findings regarding antisocial-related personality variables and their association with drug use (Kopstein, 1999; Patterson & Newman, 1993). When these personality variables were regressed on reported illicit drug use

simultaneously with marijuana, however, they were consistently not associated with reported illicit drug use. This was true across both the moderator and mediator analyses. In other words, the variance in illicit drug use accounted for by sensation seeking or antisocial behavior appears to be better accounted for by marijuana use.

Although previous work by McGue, Slutske and Iacono (1999) suggests the possibility that personality traits related to behavioral disinhibition would distinguish between marijuana users who do and do not proceed to use other illicit drugs, their research specifically examined alcoholics who proceeded to not only use illicit drugs, but abuse them. In the current sample, it is possible that most of the participants were not alcohol dependent (though symptoms of alcohol dependence were not assessed in this study), and that personality does not distinguish between these types of marijuana users. These findings suggest that while personality may have influence on the amount of drugs used, this variable is not nearly as important in determining drug use as either peer influence or amount of marijuana used. Personality may very well have an effect on the peers with whom individuals choose to associate (though this association was not directly tested in this study), but does not appear to be an important predictor of how much drugs are used or how different classes of drugs might be related.

Personality clusters from the Big 5 Inventory were also examined as moderators of the association between marijuana and other drugs, but not as mediators. None of the clusters from the Big 5 Inventory (extraversion, agreeableness, emotional stability, openness, and conscientiousness) were found to moderate the above-mentioned association. This result is consistent with the literature in that no personality cluster, other than behavioral disinhibition, has been found to be associated with either substance

use, substance addiction, or the progression from one drug to another (Davison & Neale, 1990; Price, 1999). Due to these previous research findings as well as the results of the moderator analyses involving the personality factors from the Big 5 Inventory, these variables were not examined as mediators of the association between marijuana and other drugs.

Other Variables and the Association With Marijuana and Drug Use

The hypothesis that the covariate variables (parenting styles, discipline, depression, and anxiety) would be associated with reported marijuana use was not supported. None of these variables were found to be significantly associated with marijuana use, and this finding is very surprising. As reported in Chapter One, several studies have documented the association between parenting styles and discipline, as well as depressive and anxious symptoms, with substance use. The findings of the current study, however, suggest that particular parenting styles or level of depression and anxiety do not affect how much marijuana individuals use.

One explanation for this finding is in regards to the makeup of the current sample. Participants in this study were all college students, and the vast majority were first year students. Much of the drug use on which they reported occurred during their high school years, and during this time, these students may have been relatively high functioning and experienced low levels of depression and anxiety relative to their non-college bound peers. They may also have had higher functioning parents and more stable home lives. Perhaps previous findings regarding variables associated with drug use were accounted for by samples that included students who were not high functioning or high achieving

enough to go to college. In the current sample, peer influence appears to account for most of the variance in drug use behavior, whereas these other variables do not have as much of an effect. College students appear to turn to drug use when their friends are using and not because of certain parenting styles used in their upbringing or because they feel depressed or anxious.

The hypothesis that the covariate variables (parenting styles, discipline, depression, and anxiety) would not be associated with other drug use was supported, with one exception. When the dependent variable used to measure drug use was coded as "0" for no drug use and "1" and any illicit drug use, none of the covariates were significantly associated with drug use. When the dependent variable used to measure drug use was coded as "0" for participants who used drugs five times or fewer in their lifetimes and "1" and those who used six times or more, parental authoritativeness was found to be associated with drug use, though none of the other variables were. Although this hypothesis made theoretical sense and was generally supported, these findings are somewhat surprising in hindsight. The covariates were chosen for the study based on their association with drug use in the pilot sample. Given that these covariate variables were the ones most strongly related to reported drug use in the pilot sample and have been found to be associated with drug use in previous research findings (e.g. Kushner et al., 1994; Merikangas, Dierker & Fenton, 1998), that these variables were, with one exception, not significantly associated with drug use in the full study sample is surprising. These results are consistent with those regarding the effect of parenting styles, discipline, anxiety and depression on marijuana use in that these variables do not appear to strongly influence the use of other illicit drugs either. Again, the variable that

appears to exert the biggest and most consistent effect on people's reported use of marijuana and other drugs appears to be peer influence, and college students appear to use drugs based on the influence of their peers rather than influence of their parents or their moods.

Personality related to behavioral disinhibition was also predicted to be associated with drug use, and this finding was again somewhat supported. When singularly regressed onto reported drug use, sensation seeking and antisocial acts were significantly associated with drug use. Again, as reported in Chapter One, these findings are consistent with previous results from the literature, and suggest that people who are relatively impulsive or seek excitement or novelty in their lives are more likely to use drugs than those who do not have these personality traits. As reported above, however, the association between personality and drug use becomes non-significant when marijuana is included in the regression equation. This finding suggests that marijuana use is much more important in predicting other illicit drugs use in college students than are personality traits.

Amount of Drugs Used and in Which Order

The amount of drugs used in this study were examined, as were chi-square tests to confirm the use of marijuana preceding the use of other drugs. The percentages of use in this study were similar to other reports of drug use in college student samples. For instance, Girdano and Girdano (1974) studied a sample of 1,385 students at the University of Maryland and found 87% of the participants had used alcohol, 62% marijuana, 20% "speed" (amphetamines), and 13% had used "tranquilizers" (sedative/

hypnotics). This closely mirrors the use in the present study, though even more students in the current sample used alcohol and marijuana, and fewer used stimulants and sedatives. Trends of drug use in college samples through the last few decades of the 20th century are not well documented, so the current study presents some potentially new information on the state of drug use on American college campuses in the early 21st century.

Odds of using particular classes of drugs, given marijuana use, were examined to help determine if marijuana use preceded the use of other drugs in the sample. The odds of using the various classes of drugs after the use of marijuana ranged from 37.90% for prescription drugs to 2.28% for heroin use. In all cases, the likelihood of using other classes of drugs increased with the use of marijuana. In fact, prescription drugs were the only class of drugs that participants in the current study used without having used marijuana, and that was true for only three respondents. All other reported drug use only occurred if the participant had used marijuana. Furthermore, most of the drugs used by the participants in this study were found to be used after the initiation of marijuana use. To reiterate, following the argument that where reported illicit drug use and marijuana use are not independent of each other and where illicit drug use never (or extremely rarely) occurs in the absence of marijuana use, it logically follows that marijuana use precedes the use of the other drug classes.

This result is consistent with previous findings in the research literature as was presented in Chapter One (Fergusson & Horwood, 2000; Kandel et al., 1992). Chi-square tests of independence suggested that hallucinogens, amphetamines, ecstasy, cocaine, and prescription drugs all followed the use of marijuana by the participants in

this study. Heroin and sedative/hypnotic use were not found to be independent of marijuana use, and thus it cannot be asserted that use of these drugs temporally follows the use marijuana. There was no use of these drugs without the reported use of marijuana, however, and the results do not suggest that heroin and sedative use precede the use of marijuana. It is possible, therefore, that the main reason that heroin and sedative use were not found to be independent of marijuana use was due to a lack of statistical power in these analyses due to the very low frequency of use of those drugs in the current sample.

IMPLICATIONS, LIMITATIONS, AND FUTURE DIRECTIONS

There are a couple of notable implications regarding the results of this study that warrant discussion. Taking into account the results from the present study as well as the pilot study, peer influence is by far the strongest predictor of young persons' reported drug use. Many variables that have historically had an association with drug use were examined in these studies, and peer influence emerged as a much stronger predictor of marijuana and drug use than any demographic, family or genetic, mental health related, or personality variables. These results have strong potential implications for substance abuse prevention programs. Psychologists and teachers could potentially use this information to help identify at-risk youths with whom they come into contact. When psychologists (especially school psychologists) or teachers become aware of a particular student's drug use, they might be able to use that information to monitor or provide preemptive interventions with that individual's closest peers. Though it would be hard to know exactly who is or is not doing drugs, the information gained from this study might

aid school professionals in choosing where to focus education and drug prevention resources. Furthermore, results from Peterson and Reid's (2003) study of participants in the Center for Substance Abuse Prevention (CSAP) Community Partnership found a need for developing substance abuse prevention initiatives with a particular emphasis on incorporating strategies designed to improve a sense of community. If prevention programs can help foster communities where adolescents will have non-drug using peers, it appears their risk of having problems with substance use will be significantly decreased.

The results of the current study also have implications for substance abuse treatment programs. One of the primary coping skills taught in substance abuse recovery programs is the ability to assess and avoid high risk situations (Kadden, Carroll, Donovan, Cooney, Monti, Abrams, Litt & Hester, 1992). A high risk situation is defined as places or problems that increase the likelihood of a substance user using again. The results of this study may extend high risk situations to include people with whom substance users have used various drugs in the past. Given that peer influence is such a strong predictor of substance use, it follows that someone trying to quit using would put themselves at higher risk for using if they associate with others that use. Being with people with whom they have used in the past may also created a "trigger" for many substance users, as they may have cravings based on the memory of using with particular people. Psychologists and other substance abuse treatment professionals may use this information to assist substance users in recovery to identify and avoid people who may increase their likelihood of having a relapse or cravings with which are difficult to cope.

The implications regarding marijuana as a "gateway" drug in the Stage Theory of substance use remain unclear. Although peer influence and personality related to behavioral disinhibition did not moderate the association between marijuana and other drugs, and although marijuana use appears to precede the use of other illicit drugs, it is still unclear whether or not the act of using marijuana increases the likelihood of using other drugs. The results of the current study support the contention that while some users of marijuana proceed to use other illicit drugs, many others do not. It could be argued that because alcohol is often used before marijuana and other drugs, it is also a gateway towards using other substances. Again, however, the fact remains that while some users of alcohol use other drugs, many others do not. It is quite possible that alcohol and marijuana tend to be used by most people (over 80 % of the sample used both of these drugs) because of their high level of availability and because they may be used periodically with few consequences. People who eventually use other illicit drugs may simply be starting with alcohol and marijuana because of their high availability and then move on to using "harder" drugs later, when those drugs become available or the users are ready to experiment beyond alcohol and marijuana. Further research will be needed to determine whether the acts of using alcohol and marijuana themselves contribute to an increase in the likelihood of using other substances. Future research might also attempt to further explain issues related to the Stage Theory of substance use, such as whether different variables are associated with different pathways to drug use depending on which "harder" illicit drug is used after marijuana, and how age of onset of alcohol and marijuana use relate to the progression to other drugs.

There are also several limitations of the current study which need to be taken into account regarding the interpretation of the results. The first limitation involves the use of paper and pencil measures. Although effort was made to help participants feel comfortable and help them understand that their responses were anonymous and confidential, care should be taken with interpreting self-report data. Participants may either have not felt comfortable telling the truth or are in denial regarding the true amounts of their drug use and antisocial behavior, and thus the validity of these measures may be questionable. The second limitation involves the limited range of scores on several important measures, but most prominently with marijuana and other drug use. Although many participants in the study have at least experimented with marijuana and other drugs, the vast majority of participants have relatively little experience with them. If the current study had included a drug treatment sample as well, there likely would have been more variability in drug use in the overall sample, and results regarding the main research hypothesis (peer influence and personality as moderators of the association between marijuana and other drugs) might have been different. Another possibility would be to add a sample of participants matched for age with the current sample, but who did not graduate from high school, or who graduated from high school (or passed a high school equivalency exam) but did not go to college, or both. Including participants such as these may provide a fuller picture of adolescent and young adult drug use, which could expand the range of reported drug use and help elucidate the association between marijuana and other drug use.

A third limitation to the current study is in regards to the age limitations of the sample. The vast majority of participants in this study were first year college students.

Given that most of these participants are only 18 and 19 years old, they have only had limited time and opportunity to experiment with various drugs. If participants in the sample had a wider range of ages, it is possible that they would have had more opportunity to try a wider variety of illicit drugs, which likely also would have increased the range of drug use in the sample.

A fourth and very important limitation of the present study is the cross-sectional nature of the research design. This study attempted to examine the influence of peers and personality on drug use, as well as the temporal sequence of drugs used by participants in the sample. Constructs such as peer influence and personality may very well be influenced by the use of drugs, and would be best studied in a longitudinal fashion. For instance, antisocial personality may lead to the use of marijuana and other drugs, but it is also possible that the use of marijuana and other drugs leads to antisocial personality characteristics. Similarly, people who choose drug-using peers may increase their likelihood of using drugs, but in many cases, people who use drugs may subsequently begin to associate with, or gravitate towards, other drug users. Furthermore, using a longitudinal design to study the temporal sequence of drug use, such as which classes of drugs precede or follow the use of other classes of drugs, would be much more accurately studied with the use of a longitudinal design than with the use of chi-square tests for independence in a cross-sectional design.

Several suggestions for future research have emerged from the present work. Although the main research hypotheses for the current study were not confirmed, there still remains the possibility that either or both of peer influence and personality related to behavioral disinhibition moderate and/or mediate the association between marijuana and

other drug use. Future studies might attempt to study these questions while employing a broader sample of drug users, including a drug treatment sample, as well as by employing a longitudinal design. Further research also might attempt to further clarify the associations between peer influence, personality, marijuana use, and other drug use, and potentially, the interactions between several of these variables. Finally, this study still leaves open the question of what differences do exist between marijuana users who use and abuse other illicit drugs and marijuana users who do not. Further research may attempt to help answer the question of what significant factors actually moderate the association between marijuana and other drugs.

In summary, the main research hypotheses of this study, that peer influence and personality related to behavioral disinhibition would moderate and mediate the association between marijuana and other drug use, were not supported. Peer influence was strongly and consistently related to both reported marijuana and drug use, and marijuana was also strongly and consistently related to other illicit drug use. Having drug using peers is a strong predictor of illicit drug use, including marijuana. Personality was less strongly and less consistently related to reported marijuana and drug use. Variables that have been found in the research literature to be associated with drug use, such as parenting styles, discipline, depression, and anxiety, were also not found to be associated with marijuana or drug use in the current sample. The amount of drugs used in the present sample appears to be consistent with previous research findings on college student drug use, and marijuana use precedes the use of most other classes of drugs.

In conclusion, there still remain questions regarding differences between marijuana users who do and do not proceed to use other illicit substances. Furthermore,

among college students, peer influence is a strong and consistent predictor or drug use, and psychologists and teachers may be able to use measures of peer influence to better predict an individual's use of marijuana and drugs. Finally, consistent with previous findings, marijuana use consistently precedes the use of other drugs, but the verdict regarding whether or not marijuana is a "gateway" to other illicit drug use is still unclear.

Appendix A

Personal Information

If no answer space is provided, please circle the letter that corresponds to your answer choice.

1. Age

a) 18
b) 19
c) 20
d) 21
e) 22
f) Older (Please specify:_____)

2. Gender

a) Female b) Male

3. Year in college

a) 1st
b) 2nd
c) 3rd
d) 4th
e) 5th
f) Graduate student
g) Other (Please specify: _____)

4. Ethnicity (Circle one with which you identify most):

a) White
b) Hispanic
c) Black
d) Asian
e) Other

Appendix B

Discipline Questionnaire

These questions refer to your recall of being physically punished when you were growing up. Please keep in mind the following definition of physical punishment: "An adult (18 years or older) intentionally disciplines a minor (under 18 years old) and, in the process, causes physical pain to the minor."

1. While growing up, how often were you physically punished?

Daily	A few times per week	A few times per month	A few times per year	Never
1	2	3	4	5

2. How often were other family members physically punished?

Daily	A few times per week	A few times per month	A few times per year	Never
1	2	3	4	5

3. How important was physical punishment as a primary child-rearing prcedure in your family?

Not at all important				Very important
1	2	3	4	5

4. From ages 5-12, about how frequently were you physically punished?

Daily	A few times per week	A few times per month	A few times per year	Never
1	2	3	4	5

5. From ages 5-12, how severe was the physical punishment you usually received?

1) Caused injury more severe than welts or bruises
2) Caused welts and bruises but no other injury
3) Caused considerable pain but no welts, bruises or other injury
4) Caused moderate pain
5) Caused mild pain
6) I was never physically punished

6. From age 13-present, how often have you been physically punished?

Daily	A few times per week	A few times per month	A few times per year	Never
1	2	3	4	5

7. From ages 13-present, how severe was the physical punishment you usually received?

1) Caused injury more severe than welts or bruises
2) Caused welts and bruises but no other injury
3) Caused considerable pain but no welts, bruises or other injury
4) Caused moderate pain
5) Caused mild pain
6) I was never physically punished

8. What was the most severe physical punishment that you ever received?

1) Caused injury more severe than welts or bruises
2) Caused welts and bruises but no other injury
3) Caused considerable pain but no welts, bruises or other injury
4) Caused moderate pain
5) Caused mild pain
6) I was never physically punished

9. Were objects ever used in the physical punishment?

Never		About half the time		Always
1	2	3	4	5

10-12. Usually, how did the person act while punishing you?

Extremely angry				Not at all angry
1	2	3	4	5

Loving				Hateful
1	2	3	4	5

Controlled				Out of control
1	2	3	4	5

13. Usually, how justified was the person in punishing you?

Completely Unjustified	Somewhat unjustified	Not certain	Somewhat justified	Completely justified
1	2	3	4	5

14. How often was the physical punishment effective in getting you to do what the adult wanted you to do?

Never		About half the time		Always
1	2	3	4	5

15. How often was the physical punishment effective in teaching something of importance to you?

Never		About half the time		Always
1	2	3	4	5

16. How much resentment did you feel about being punished?

None	A little	Some	Much	A great deal
1	2	3	4	5

17. How often did you deserve the physical punishment?

Never		About half the time		Always
1	2	3	4	5

18. How much were you physically punished?

Not enough		About the right amount		Too much
1	2	3	4	5

Appendix C

Parental Authority Questionnaire

For each of the following statements, circle the number on the 5-point scale that best indicates how that statement applies to you and your parents. Try to read and think about each statement as it applies to you while growing up at home. There are no right or wrong answers, so don't spend a lot of time on any one item. We are looking for your overall impression regarding each statement. Be sure not to omit any items.

1	2	3	4	5
Strongly disagree	Disagree	Undecided	Agree	Strongly agree

1. While I was growing up my parents felt that in a well-run home the children should have their way in the family as often as the parents do.
1 2 3 4 5

2. Even if their children didn't agree with them my parents felt that it was for our own good if we were forced to conform to what they thought was right.
1 2 3 4 5

3. Whenever my parents told me to do something as I was growing up, they expected me to do it immediately without asking questions.
1 2 3 4 5

4. As I was growing up, once family policy had been established, my parents discussed the reasoning behind the policy with the children in the family.
1 2 3 4 5

5. My parents have always encouraged verbal give-and-take whenever I have felt that family rules and regulations were unreasonable.
1 2 3 4 5

6. My parents have always felt that what children need is to be free to make up their own minds and to do what they want to do, even if this does not agree with what their parents want.
1 2 3 4 5

7. As I was growing up my parents did not allow me to question any decision that they made.
1 2 3 4 5

1	2	3	4	5
Strongly disagree	Disagree	Undecided	Agree	Strongly agree

8. As I was growing up my parents directed the activities and decisions of the children in the family through reasoning and discipline.
1 2 3 4 5

9. My parents have always felt that more force should be used by parents in order to get their children to behave the way they are supposed to.
1 2 3 4 5

10. As I was growing up my parents did not feel that I needed to obey rules and regulations of behavior simply because someone in authority had established them.
1 2 3 4 5

11. As I was growing up I knew what my parents expected of me in my family, but I also felt free to discuss those expectations with them when I felt that they were unreasonable.
1 2 3 4 5

12. My parents felt that wise parents should teach their children early just who is boss in the family.
1 2 3 4 5

13. As I was growing up, my parents seldom gave me expectations and guidelines for my behavior.
1 2 3 4 5

14. Most of the time as I was growing up, my parents did what the children in the family wanted when making family decisions.
1 2 3 4 5

15. As the children in my family were growing up, my parents consistently gave us direction and guidance in rational and objective ways.
1 2 3 4 5

16. As I was growing up my parents would get very angry if I tried to disagree with him.
1 2 3 4 5

17. My parents feel that most problems in society would be solved if parents would not restrict their children's activities, decisions, and desires as they are growing up.
1 2 3 4 5

1	2	3	4	5
Strongly disagree	Disagree	Undecided	Agree	Strongly agree

18. As I was growing up my parents let me know what behaviors they expected of me and if I didn't meet those expectations, they punished me.
1 2 3 4 5

19. As I was growing up my parents allowed me to decide most things for myself without a lot of direction from them.
1 2 3 4 5

20. As I was growing up my parents took the children's opinions into consideration when making family decisions, but they would not decide for something simply because the children wanted it.
1 2 3 4 5

21. My parents did not view themselves as responsible for directing and guiding my behavior as I was growing up.
1 2 3 4 5

22. My parents had clear standards of behavior for the children in our home as I was growing up, but they were willing to adjust those standards to the needs of each of the individual children in the family.
1 2 3 4 5

23. My parents gave me direction for my behavior and activities as I was growing up and they expected me to follow their directions, but they were always willing to listen to my concerns and discuss that direction with me.
1 2 3 4 5

24. As I was growing up my parents allowed me to form my own point of view on family matters and he generally allowed me to decide for myself what I was going to do.
1 2 3 4 5

25. My parents have always felt that most problems in society would be solved if we could get parents to strictly and forcibly deal with their children when they don't do what they are supposed to as they are growing up.
1 2 3 4 5

26. As I was growing up my parents often told me exactly what they wanted me to do and how they expected me to do it.
1 2 3 4 5

1	2	3	4	5
Strongly disagree	Disagree	Undecided	Agree	Strongly agree

27. As I was growing up my parents gave me clear direction for my behaviors and activities, but they were also understanding when I disagreed with them.
1 2 3 4 5

28. As I was growing up my parents did not direct the behaviors, activities, and desires of the children in the family.
1 2 3 4 5

29. As I was growing up I knew what my parents expected of me in the family and they insisted that I conform to those expectations simply out of respect for their authority.
1 2 3 4 5

30. As I was growing up, if my parents made a decision in the family that hurt me, they were willing to discuss that decision with me and to admit it if they had made a mistake.
1 2 3 4 5

Appendix D

PADAS

Please circle the number that describes your relationship with your peers the best.

1. How many of your friends…	None	One or two	Some	Most
a) get drunk once in a while	1	2	3	4
b) Get drunk almost every weekend	1	2	3	4

2. How often have your friends asked you to get drunk?

1	2	3	4
A lot	Some	Not much	Not at all

3. How much would your friends try to stop you from getting drunk?

1	2	3	4
A lot	Some	Not much	Not at all

4. How many of your friends do each of the following…?

	None	One or two	Some	Most
a) Use marijuana	1	2	3	4
b) Use cocaine	1	2	3	4
c) Sniff glue, gas, or whet?	1	2	3	4
d) Use uppers (including speed, amphetamines)	1	2	3	4
e) Use downers or opiates (incl. Heroin)	1	2	3	4
f) Get drunk	1	2	3	4
g) Smoke cigarettes	1	2	3	4

5. How often have your friends asked you to use…?

	Not at all	Not often	Some	Often
a) marijuana	1	2	3	4
b) cocaine	1	2	3	4
c) "Sniff": glue, gas, or whet?	1	2	3	4
d) uppers (including speed, amphetamines)	1	2	3	4
e) downers or opiates (incl. Heroin)	1	2	3	4
f) alcohol	1	2	3	4
g) cigarettes	1	2	3	4

6. How much would your friends try to stop you from…?

	Not at all	Not much	Some	A lot
a) Using marijuana	1	2	3	4
b) Using cocaine	1	2	3	4
c) Sniffing glue, gas, or whet?	1	2	3	4
d) Using uppers (including speed, amphetamines)	1	2	3	4

e) Using downers or opiates (incl. Heroin)	1	2	3	4
f) Getting drunk	1	2	3	4
g) Smoking cigarettes	1	2	3	4

7. How much would you try to stop your friends from…?

	Not at all	Not much	Some	A lot
a) Using marijuana	1	2	3	4
b) Using cocaine	1	2	3	4
c) Sniffing glue, gas, or whet?	1	2	3	4
d) Using uppers (including speed, amphetamines)	1	2	3	4
e) Using downers or opiates (incl. Heroin)	1	2	3	4
f) Getting drunk	1	2	3	4
g) Smoking cigarettes	1	2	3	4

8. Have any of your friends…?

	Yes	No
a) flunked a year of school	1	2
b) been expelled from school	1	2
c) been suspended from school	1	2
d) dropped out	1	2

9. Do your friends care about you?

Not at all	Not much	Some	A lot
1	2	3	4

10. How much do you care about your friends?

Not at all	Not much	Some	A lot
1	2	3	4

11. Are you close to your friends?

Not at all	Not much	Some	A lot
1	2	3	4

12. Does your family approve of you friends?

None of Them	A few of them	Quite a few of them	Most of them	All of them
1	2	3	4	5

13. Does your family think your friends are bad for you?

No	Not much	Some	A lot
1	2	3	4

14. Have you ever been in a street gang?

1) I will never join a gang
2) I used to be in a gang, but not now
3) I will join a gang later
4) Not a member of a gang, but I hang out with a gang
5) In a gang now

15. How many of your friends are in a street gang?

None of Them	A few of them	Quite a few of them	Most of them	All of them
1	2	3	4	5

16. Do your friends fight with other kids?

Not at all	Not much	Some	A lot
1	2	3	4

17. Do your friends pick on or bully other kids?

Not at all	Not much	Some	A lot
1	2	3	4

18. Do your friends…?

	Not at all	Not much	Some	A lot
a) like school	1	2	3	4
b) like their teachers	1	2	3	4
c) think school is fun	1	2	3	4

19. What kind of grades do your friends get?

Very good	Good	Not too good	Poor
1	2	3	4

Appendix E

SSS

For each of the following statements, circle the number on the 5-point scale that best indicates how that statement describes you. There are no right or wrong answers, so don't spend a lot of time on any one item. We are looking for your overall impression regarding each statement. Be sure not to omit any items.

1	2	3	4	5
Strongly agree	Agree	Neutral	Disagree	Strongly Disagree

1. I often wish I could be a mountain climber.
1 2 3 4 5

2. I like some of the earthy body smells.
1 2 3 4 5

3. I sometimes do things that are a little frightening.
1 2 3 4 5

4. I like wild, "uninhibited" partites.
1 2 3 4 5

5. I can't stand watching a movie that I've seen before.
1 2 3 4 5

6. I would like to take up the sport of water skiing.
1 2 3 4 5

7. I like to explore a strange city or section of town by myself, even if it means getting lost.
1 2 3 4 5

8. I get bored seeing the same old faces.
1 2 3 4 5

9. I enjoy the company of real "swingers".
1 2 3 4 5

10. I have tried marijuana or would like to.
1 2 3 4 5

11. When you can predict almost everything a person will do and say, he or she must be a bore.
1 2 3 4 5

12. I would like to try surfboard riding.
1 2 3 4 5

13. I would like to try some of the drugs that produce hallucinations.
1 2 3 4 5

14. I often like to get high (drinking liquor or smoking marijuana).
1 2 3 4 5

15. I would like to learn to fly an airplane.
1 2 3 4 5

16. I like to try new foods that I have never tasted before.
1 2 3 4 5

17. I like to have new and exciting experiences and sensations even if they are a little unconventional or illegal.
1 2 3 4 5

18. I usually don't enjoy a movie or play where I can predict what will happen in advance.
1 2 3 4 5

19. I like to date people whom I find physically exciting.
1 2 3 4 5

20. I would like to take off on a trip with no preplanned or definite routes or timetables.
1 2 3 4 5

21. I would like to go scuba diving.
1 2 3 4 5

22. Looking at someone's home movies or travel slides bores me tremendously.
1 2 3 4 5

23. I prefer friends who are excitingly unpredictable.
1 2 3 4 5

24. I often find beauty in the clashing colors and irregular form of modern painting.
1 2 3 4 5

25. People should dress in individual ways even if the effects are sometimes strange.
1 2 3 4 5

26. Keeping the drinks full is the key to a good party.
1 2 3 4 5

27. I would like to try parachute jumping.
1 2 3 4 5

28. I get very restless if I have to stay around home for any length of time.
1 2 3 4 5

29. A person should have considerable sexual experience before marriage.
1 2 3 4 5

30. I could conceive of myself seeking pleasures around the world with the "jet set".
1 2 3 4 5

31. I like to dive off the high board.
1 2 3 4 5

32. The worst social sin is to be a bore.
1 2 3 4 5

33. I like people who are sharp and witty even if they do sometimes insult others.
1 2 3 4 5

34. I would like to sail a long distance in a small but seaworthy sailing craft.
1 2 3 4 5

35. I enjoy watching sex scenes in movies.
1 2 3 4 5

36. I think I would enjoy the sensations of skiing very fast down a high mountain slope.
1 2 3 4 5

37. I feel best after taking a couple of drinks.
1 2 3 4 5

38. I have no patience with dull or boring persons.
1 2 3 4 5

39. I like to make friends with people who are unconventional or even strange.
1 2 3 4 5

40. I would like to meet more people who are different than me.
1 2 3 4 5

Appendix F

Misbehavior Inventory (MBI)

Please think very carefully about the following items. If you are not sure about the exact number of times, please provide your best guess.

How many times in your lifetime have you:

_____ 1) purposely damaged or destroyed other property that did not belong to you.

_____ 2) stolen(or tried to steal) a motor vehicle, such as a car or motorcycle

_____ 3) shoplifted something.

_____ 4) knowingly bought, sold, or held stolen goods (or tried to do any of these things).

_____ 5) thrown objects (such as rocks, snowballs, or bottles) at cars or people.

_____ 6) run away from home.

_____ 7) lied about your age to gain entrance or to purchase something; for example, lying about your age to buy liquor or get into a movie.

_____ 8) carried a hidden weapon other than a plain pocket knife.

_____ 9) attacked someone with the idea of seriously hurting or killing him/her.

_____ 10) have paid for having sexual relations with someone.

_____ 11) parked in an illegal parking spot.

_____ 12) been involved in a gang activity.

_____ 13) sold marijuana or hashish ("pot", "grass", "hash").

_____ 14) cheated on school tests.

_____ 15) hitchhiked where it was illegal to do so.

_____ 16) stolen money or other things from your parents or other members of your family.

_____ 17) hit (or threatened to hit) someone.

_____ 18) been loud, rowdy, or unruly in a public place (disorderly conduct).

_____ 19) sold hard drugs, such as heroin, cocaine, and LSD.

_____ 20) taken a vehicle for a ride (drive) without the owner's permission.

_____ 21) bought or sold liquor for a minor.

_____ 22) had (or tried to have) sexual relations with someone against their will.

_____ 23) used physical force to get money or things from other students.

_____ 24) avoided paying for things as movies, bus, or subway rides, and food.

_____ 25) been drunk in public places.

_____ 26) stolen (or tried to steal) things worth between $5 and $50.

_____ 27) stolen (or tried to steal) something at school, such as someone's coat from classroom, locker, or cafeteria, or a book from the library.

_____ 28) broken into a building or vehicle (or tried to break in) to steal something or just to look around.

_____ 29) begged for money or things from strangers.

_____ 30) failed to return extra change that a cashier gave you by mistake.

_____ 31) been suspended from school.

_____ 32) made obscene telephone calls, such as calling someone and saying dirty things.

_____ 33) swear at adults (e.g. parents, salesperson, telephone solicitors).

_____ 34) purposely harassed someone on the telephone or on email.

_____ 35) beeped in anger at other drivers.

_____ 36) yelled at other drivers so they could hear you.

_____ 37) tried to hurt someone’s feelings.

_____ 38) failed to report items at Customs.

_____ 39) ridiculing someone you dislike.

_____ 40) ridiculing someone who is helpless.

_____ 41) bullying someone for no good reason.

_____ 42) number of times you have been arrested.

_____ 43) handed in a school essay that you had copied from someone else.

How many times in your lifetime have you used:

_____ 43) alcoholic beverages (beer, wine, and hard liquor).

_____ 44) marijuana or hashish ("pot", "grass", "hash").

_____ 45) hallucinogens ("LSD", "Mescaline", "Peyote", "Acid", “Mushrooms”).

_____ 46) amphetamines ("Uppers", "Speed", "Whites", “Crystal Meth”).

_____ 47) barbiturates ("Downers", "Reds").

_____ 48) heroin ("Horse", "Smack").

_____ 49) cocaine (“coke”)

_____ 50) ecstasy (“X”)

_____ 51) prescription drugs (valium, codeine) without a prescription.

Appendix G

BFI (V44)

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
1	**2**	**3**	**4**	**5**

I See Myself as Someone Who . . .

_____1. Is talkative

_____2. Tends to find fault with others

_____3. Does a thorough job

_____4. Is depressed, blue

_____5. Is original, comes up with new ideas

_____6. Is reserved

_____7. Is helpful and unselfish with others

_____8. Can be somewhat careless

_____9. Is relaxed, handles stress well

_____10. Is curious about many different things

_____11. Is full of energy

_____12. Starts quarrels with others

_____13. Is a reliable worker

_____14. Can be tense

_____15. Is ingenious, a deep thinker

_____23. Tends to be lazy

_____24. Is emotionally stable, not easily upset

_____25. Is inventive

_____26. Has an assertive personality

_____27. Can be cold and aloof

_____28. Perseveres until the task is finished

_____29. Can be moody

_____30. Values artistic, aesthetic experiences

_____31. Is sometimes shy, inhibited

_____32. Is considerate and kind to almost everyone

_____33. Does things efficiently

_____34. Remains calm in tense situations

_____35. Prefers work that is routine

_____36. Is outgoing, sociable

_____37. Is sometimes rude to others

_____16. Generates a lot of enthusiasm

_____17. Has a forgiving nature

_____18. Tends to be disorganized

_____19. Worries a lot

_____20. Has an active imagination

_____21. Tends to be quiet

_____22. Is generally trusting

_____38. Makes plans and follows through with them

_____39. Gets nervous easily

_____40. Likes to reflect, play with ideas

_____41. Has few artistic interests

_____42. Likes to cooperate with others

_____43. Is easily distracted

_____44. Is sophisticated in art, music, or literature

Please check: Did you write a number in front of each statement?

Appendix H

BDI-II

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during **the past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 or Item 18.

1. Sadness
0 I do not feel sad.
1. I feel sad much of the time.
2 I am sad all of the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism
0 I am not discouraged about my future.
1 I feel more discouraged about my future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure
0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

4. Loss of Pleasure
0 I get as much pleasure as I ever did from the things I enjoy.
1 I don't enjoy things as much as I used to.
2 I get very little pleasure from the things I used to enjoy.
3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings
0 I don't feel particularly guilty.
1 I feel guilty over many things I have done or should have done.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

6. Punishment Feelings
0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike
0 I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness
0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all of my faults.
3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes
0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10. Crying
0 I don't cry any more than usual.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying, but I can't.

11. Agitation
0 I am no more restless of wound up than usual.
1 I feel more restless or wound up than usual.
2 I am so restless or agitated that it's hard to stay still.
3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest
0 I have not lost interest in other people or activities.
1 I am less interested in other people of things than before.
2 I have lost most of my interest in other people or things.
3 It's hard to get interested in anything.

13. Indecisiveness
0 I make decisions about as well as ever.
1 I find it more difficult to make decisions than usual.
2 I have much greater difficulty in making decisions than I used to.
3 I have trouble making any decisions.

14. Worthlessness
0 I do not feel I am worthless.
1 I don't consider myself as worthwhile and useful as I used to.
2 I feel more worthless as compared to other people.
3 I feel utterly worthless.

15. Loss of Energy
0 I have as much energy as ever.
1 I have less energy than usual.
2 I don't have enough energy to do very much.
3 I don't have enough energy to anything.

16. Changes in Sleeping Pattern
0 I have not experienced any change in my sleeping pattern.
1a I sleep somewhat more than usual.
1b I sleep somewhat less than usual.
2a I sleep a lot more than usual.
2b I sleep a lot less than usual.
3a I sleep most of the day.
3b I wake up 1-2 hours early and can't get back to sleep.

17. Irritability
0 I am no more irritable than usual.
1 I am more irritable than usual.
2 I am much more irritable than usual.
3 I am irritable all the time.

18. Changes in Appetite
0 I have not experienced any change in my appetite.
1a My appetite is somewhat more than usual.
1b My appetite is somewhat less than usual.
2a My appetite is much less than before.
2b My appetite is much greater than usual.
3a I have no appetite at all.
3b I crave food all the time.

19. Concentration Difficulty
0 I can concentrate as well as ever.
1 I can't concentrate as well as usual.
2 It's very hard to keep my mind on anything for very long.
3 I find I can't concentrate on anything.

20. Tiredness or Fatigue
0 I am no more tired or fatigued than usual.
1 I get tired or fatigued more easily than usual.
2 I am too tired or fatigued to do a lot of the things I used to do.
3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex
0 I have not noticed any recent changes in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely.

Appendix I

BAI

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by each symptom during the PAST WEEK, INCLUDING TODAY, by placing an X in the corresponding space in the column next to each symptom.

Not at all Mildly Moderately Severely

1. Numbness of tingling.

2. Feeling hot.

3. Wobbliness in legs.

4. Unable to relax.

5. Fear of the worst happening.

6. Dizzy or lightheaded.

7. Heart pounding or racing.

8. Unsteady.

9. Terrified.

10. Nervous.

11. Feelings of choking.

12. Hands trembling.

13. Shaky.

14. Fear of losing control.

15. Difficulty breathing.

16. Fear of dying.

17. Scared.

18. Indigestion or discomfort in abdomen.

19. Faint.

20. Face flushed.

21. Sweating (not due to heart).

Appendix J

Descriptive Statistics for Study Measures

Measure	Min.	Max.	Mean	S.D.	Alpha
Eval. Past phys. Punishment	1.17	4.17	2.68	0.51	0.37
Parental Permissive-ness	11.00	40.00	23.57	5.74	0.66
Parental Authoritat-iveness	16.00	50.00	36.63	6.67	0.87
BDI total	0.00	40.00	9.37	7.91	0.89
BAI total	21.00	69.00	31.57	9.82	0.90
Extraversion	20.00	40.00	31.16	4.05	0.71
Agreeableness	25.00	45.00	36.18	3.88	0.66
Conscientious-ness	26.00	45.00	35.77	3.72	0.64
Emo. Stability	22.00	40.00	30.68	3.17	0.47
Openness	27.00	50.00	39.22	5.12	0.59
PADAS	94.00	132.00	112.53	6.54	0.60
SSS total	63.00	159.00	110.16	19.39	0.87

Measure	Min.	Max.	Mean	S.D.
Misbehavior Inv. Total	4	2713	239.31	366.61
Misbehavior Inv. Quartiles	1	4	2.52	1.12
Number of times used marijuana	0	6000	140.26	549.58
Number of times used marijuana Quartiles	1	4	2.53	1.09
Dependent Variable 1 (no drugs vs. any drug use)	0	1	0.48	0.50
Dependent Variable 2 (5 or less vs. 6 or more	0	1	0.25	0.44
Total illicit drug use (other than marijuana)	0	390	13.69	44.57

Appendix K

Correlations Between Study Measures (Marijuana Users Only)

Measure		A	B	C	D	E	F	G	H	I	J	K	L
A	*r*	1	-.15	.02	-.02	-.03	.02	.05	.04	-.04	-.06	.01	.15
	p	.	.03	.79	.75	.63	.79	.50	.58	.56	.42	.94	.03
B	*r*	-.15	1	.23	-.05	-.02	-.06	-.04	-.14	.08	.13	.10	-.14
	p	.03	.	.00	.43	.78	.41	.60	.04	.22	.05	.14	.05
C	*r*	.02	.23	1	-.31	-.22	.14	.23	.21	.11	-.07	-.00	.18
	p	.79	.00	.	.00	.00	.03	.00	.00	.09	.31	.95	.01
D	*r*	-.02	-.05	-.31	1	.64	-.19	-.24	-.16	-.35	-.03	-.02	-.13
	p	.75	.43	.00	.	.00	.00	.00	.02	.00	.63	.78	.05
E	*r*	-.03	-.02	-.22	.64	1	-.08	-.18	-.14	-.34	-.03	.03	-.12
	p	.63	.78	.00	.00	.	.24	.01	.04	.00	.69	.64	.08
F	*r*	.02	-.06	.14	-.19	-.08	1	.39	.39	.20	.30	.07	-.13
	p	.79	.41	.03	.00	.24	.	.00	.00	.00	.00	.31	.05
G	*r*	.05	-.04	.23	-.24	-.18	.39	1	.34	.29	.11	-.04	.06
	p	.50	.60	.00	.00	.01	.00	.	.00	.00	.10	.60	.41
H	*r*	.04	-.14	.21	-.16	-.14	.39	.34	1	.27	.03	-.16	.14
	p	.58	.04	.00	.02	.04	.00	.00	.	.00	.65	.02	.04
I	*r*	-.04	.08	.11	-.35	-.34	.20	.29	.27	1	.14	-.04	-.13
	p	.56	.22	.09	.00	.00	.00	.00	.00	.	.05	.60	.05
J	*r*	-.06	.13	-.07	-.03	-.03	.30	.11	.03	.14	1	.08	-.41
	p	.42	.05	.31	.63	.69	.00	.10	.65	.05	.	.24	.00
K	*r*	.01	.10	-.00	-.02	.03	.07	-.04	-.16	-.04	.08	1	-.33
	p	.94	.14	.95	.78	.64	.31	.60	.02	.60	.24	.	.00
L	*r*	.15	-.14	.18	-.13	-.12	-.13	.06	.14	-.13	-.41	-.33	1
	p	.03	.05	.01	.05	.08	.05	.41	.04	.05	.00	.00	.

Legend:

A Evaluation of Past Physical Punishment
B Parental Permissiveness
C Parental Authoritativeness
D BDI total
E BAI total
F Extraversion
G Agreeableness
H Conscientiousness

I Emotional Stability
J Openness
K PADAS
L SSS total

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